Boulder Creek Restoration Project

Wildlife Report

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Introduction

This document details the analysis and discloses the potential effects on selected wildlife species from the Boulder Creek Restoration Project (BCRP) alternatives on the Bonners Ferry Ranger District of the Idaho Panhandle National Forests (IPNF). The IPNF proposes to manage forest vegetation on up to 11,668 acres (depending on the alternative chosen) within the project area using a variety of methods. Commercial timber harvest would take place on approximately 3,433 acres, including yarding by ground based equipment on 1862 acres, skyline machinery on 631 acres, a combination of ground based and skyline on 595 acres, and helicopter on 345 acres. Post-harvest fuels reduction treatments would employ both grapple piling and prescribed fire. A fuel break about 22 acres in size would also be implemented on Black Mountain below the lookout. In less accessible areas, prescribed burning would be used on up to 7,407 acres (under alternative 2) to create a mosaic of openings in the forest canopy, reduce fuel loading and continuity across the landscape and return the role of fire back into the local ecosystem. Additionally, about 806 acres of precommercial thinning is also proposed in lower and medium elevations within the BCRP area.

To facilitate project implementation and improve grizzly bear habitat security, the BCRP proposes about 76 miles of road maintenance and reconstruction, 3.2 miles of temporary road construction, 13.4 miles of road storage, and 0.7 mile of road decommissioning. Road 2209 is currently seasonally closed from April 1 through November 30. To improve user access to the Kootenai River Walk trail (Tr 184), the project proposes to change the closure to April 1 through June 15 and construct a small parking area at the beginning of the trail approximately 2.1 miles behind the current gate. The project also proposes to store currently restricted FSR 1304G, and convert its surface to a non-motorized mountain bike trail to serve as additional single track access to the Timber Mountain trail (Tr 51). Other recreational improvements include improving turnarounds and parking at six trailheads; and construction of an interpretive trail, toilet and parking lot at the Boulder City ghost town.

We also propose to treat weed populations along trailheads and roads within the project planning area using USFS approved herbicides and weed management practices. A complete narrative of the project, including specific location and alternative descriptions, can be found in detail in the BCRP Environmental Assessment (EA).

Regulatory Framework

The regulatory framework providing direction for the management of wildlife habitat most pertinent to this analysis comes primarily from the following sources:

- The Endangered Species Act of 1973 (ESA), as amended
- National Forest Management Act of 1976 (NFMA)
- IPNF Revised Land Management Plan (USDA Forest Service 2015)
- Forest Service Manual (FSM) and Handbook (FSH) direction
- The Migratory Bird Treaty Act of 1918, as amended

Following is a summary of regulatory guidance and its relation to the management of wildlife species and habitats on the Idaho Panhandle National Forests.

Endangered Species Act

The Endangered Species Act requires the Forest Service to assist in recovery of threatened, endangered, and proposed species and the ecosystems upon which they depend. Section 7 of the Act directs federal agencies to ensure that actions authorized, funded, or carried out by them are not likely to jeopardize the continued existence of any threatened or endangered species or result in the destruction or adverse modification of their critical habitat. The Forest Service is required to consult with the U.S. Fish and Wildlife Service if a proposed activity may affect individuals or habitat of a listed species. The direction requires the Forest Service to complete biological assessments to document whether projects would likely have adverse effects on identified habitats or individuals of threatened or endangered animals. A biological assessment for the BCRP will be prepared, and Section 7 consultation completed, prior to a decision being issued for the project.

A list of threatened and endangered species and designated critical habitat that may be present in the BCRP area was obtained from Fish and Wildlife Service on July 31, 2017 (project file). Terrestrial wildlife species on the list include the threatened grizzly bear (*Ursus arctos*), threatened Canada lynx (*Lynx canadensis*), and proposed (threatened) North American wolverine (*Gulo gulo*).

National Forest Management Act

The National Forest Management Act (NFMA) provides for balanced consideration of all resources. It requires the Forest Service to "provide for a diversity of plant and animal communities based on the suitability and capability of the specific land area in order to meet overall multiple-use objectives" (NFMA Sec. 6[g][3][B]). Additional guidance is found in Forest Service Manual direction that states: "identify and prescribe measures to prevent adverse modification or destruction of critical habitat and other habitats essential for the conservation of endangered, threatened and proposed species" (FSM 2670.31 [6]).

Land and Resource Management Plan

The Idaho Panhandle National Forest Land and Resource Management Plan (Forest Plan) provides Forest-wide standards and guidelines for wildlife. Standards and Guidelines are discussed, where applicable, under individual species analyses ("Consistency with the Forest Plan" section). Compliance with Forest wide Goals, Desired Conditions, Objectives, and other Standards and Guidelines is documented in the project file.

Management Area

The Boulder Creek Project wildlife cumulative effects area is roughly comprised of equal portions of Management Area 5 (MA5 - Backcountry) and Management Area 6 (MA6 – General Forest), with small inclusions of MA2b (Eligible Wild and Scenic Rivers) and MA4a (Research Natural Areas). No project activities are proposed in MA2b or MA4a. There are no Forest Plan elements specific to the wildlife resource in MA6. A Desired Condition for MA5 is to retain "large remote areas with little human disturbance." No roads would be built in MA5, so remoteness of these areas would not be affected. Ground-based harvest units are generally adjacent to open roads, where an ambient level of disturbance is already present. Disturbance in burn areas would be limited to a few days per burn unit. Helicopter logging units are all within one mile of drivable forest roads (as opposed to the interior of remote areas), so would cause disturbance to a relatively small part of any large remote area and would not result in long-term presence. As a result, remote undisturbed habitat would be retained.

Management Indicator Species – Focal Species

Management Indicator Species (MIS) were identified in the Forest Plan Revision process and were proposed because they represented an issue or concern. On June 23, 2016, the IPNF administratively changed the monitoring under the Plan to comply with the 2012 Planning Rule. At that time, MIS were removed and the landbird assemblage (olive-sided flycatcher, dusky flycatcher, Hammond's flycatcher, chipping sparrow and hairy woodpecker) were added as Focal Species to monitor integrity of terrestrial vegetation structure and function.

The focal species concept uses the coarse-filter approach for providing diversity of plant and animal communities and the persistence of native species in the planning area. Therefore, it is inappropriate to analyze effects to focal species at the project level. Instead, focal species are used to monitor effects of the Plan itself, and will be discussed in biannual monitoring evaluation reports. The landbird assemblage will be monitored at the Forest-level scale by the ongoing effort of the Integrated Monitoring using Bird Conservation Regions (IMBCR).

Forest Service Manual and Handbook Direction

The Forest Service Manual also directs the regional forester to identify sensitive species for each national forest where species viability may be a concern. The direction requires the Forest Service to manage the habitat of the species listed in the regional sensitive species list to prevent further declines in populations, which could lead to listing under the Endangered Species Act.

Effective May 27, 2011 the regional forester updated the sensitive species list for the Northern Region of the Forest Service. There were no changes from the previous (2004) list on the Idaho Panhandle National Forests. Since that time, gray wolf has been removed from the list of threatened, endangered, and proposed species and subsequently placed on the sensitive species list. The status of this species will periodically be reviewed by the Forest Service.

Migratory Bird Treaty Act and Executive Order

The Migratory Bird Treaty Act, as amended, made the taking, killing or possessing of migratory birds unlawful. Executive Order 13186 of 2001 clarified the responsibilities of Federal agencies regarding migratory bird conservation and directed Federal agencies to evaluate the effects of Federal actions on migratory birds with an emphasis on species of concern. The Executive Order also directed Federal agencies to develop a memorandum of understanding (MOU) with the Fish and Wildlife Service regarding their role with respect to the Migratory Bird Treaty Act.

In December 2008, the Forest Service entered into a MOU with the Fish and Wildlife Service that further clarified the responsibility of the Forest Service to protect migratory birds (USDA Forest Service and USDI Fish and Wildlife Service 2008). In the MOU, the Forest Service agreed to consider the most up-to-date Fish and Wildlife Service list of Birds of Conservation Concern (USDI Fish and Wildlife Service 2008) when developing or amending land management plans, and to evaluate the effects of agency actions on migratory birds within the NEPA analysis process, focusing first on species of management concern along with their priority habitat and key risk factors. For the IPNF, the bird species of management concern include those species designated as sensitive and focal species.

Topics and Issues Addressed in This Analysis

Purpose and Need

The IPNF 2015 revised Land Management Plan requires all Grizzly Bear Management Units (BMUs) to be brought up to identified standards for motorized access management by 2019. The BCRP is within the Boulder BMU, which is one of only two BMUs under IPNF jurisdiction within the Cabinet-Yaak Recovery Zone that currently does not meet the LMP standards for core (percent of BMU more than 500 meters from a motorized route) and Total Motorized Route Density ("TMRD" – percent of BMU containing a motorized route density greater than 1 mile/mile^2). Part of the purpose and need for this project is to contribute to grizzly bear recovery by moving the Boulder BMU into compliance with the standards of the Grizzly Bear Access Amendment for the Bear Management Units through increasing core habitat and decreasing Total Motorized Route Density (TMRD). In order to meet motorized access standards, it will be necessary to close (either through long-term storage or decommissioning) several miles of existing roads in the BMU. Both action alternatives contain this feature.

The purpose and need also points out that a large percentage of the project area is composed of forest stands that are relatively similar in size and age, and are not providing a range of wildlife habitats similar to what would have been available prior to European settlement. The project identifies a need to promote the long-term persistence and stability of wildlife habitat and biodiversity by trending toward an ecosystem composed of vegetation that more closely resembles the historic range of variability. This would be accomplished through the regeneration harvest and burning proposed by the project. Both action alternatives would achieve the purpose and need to some degree, although the proposed action (alternative 2) would treat more acres and, subsequently, trend more of the project area toward the pre-settlement condition.

Species Screen

A preliminary analysis was conducted for each potentially affected wildlife species and their habitat to determine the scope of project analysis. The species listed in the following table: 1) do not have suitable habitat or are not regularly present or expected to be in or near the proposed activity area; or 2) are affected at a level that does not increase risk to the species, or effects have been adequately mitigated by altering the design of the project. For these reasons, these species were not analyzed in detail. Preliminary analysis information and effects determinations for these species are located in the project file.

Table 1. Wildlife species not analyzed in detail

Species	Preferred Habitat	Rationale for Elimination from Detailed Analysis
Threatened, Endangered and Proposed Species		
Woodland Caribou (*Rangifer tarandus caribou*)	Above 4,000 ft. in Engelmann spruce/subalpine fir and western red cedar/western hemlock forests	The project area is outside of the Woodland Caribou Recovery Zone, contains no suitable caribou habitat and is not within proposed critical habitat for caribou.
North American Wolverine (*Gulo gulo*)	Far-ranging omnivorous habitat generalist	No project activities in or near (within ¼ mile of) suitable maternal denning habitat during the natal/maternal denning period. No decrease in prey densities or increased access to remote areas.

Species	Preferred Habitat	Rationale for Elimination from Detailed Analysis
Sensitive Species		
American Peregrine Falcon (*Falco peregrinus anatum*)	Open habitats near cliffs and mountains. Nesting cliffs near an adequate prey base	No suitable habitat exists in the project area for this species.
Bald Eagle (*Haliaeetus leucocephalus*)	Normally nest and forage near large bodies of water; winter visitors and yearlong residents of northern Idaho	No project activities within the distances recommended by the National Bald Eagle Management Guidelines for protection of bald eagle nests, winter roosting or foraging habitat.
Black Swift (*Cypseloides niger*)	Builds nest behind or next to waterfalls and wet cliffs	No impacts to suitable nesting habitat or vegetative diversity.
Black-backed Woodpecker (*Picoides arcticus*)	The presence of bark-beetle outbreaks and post-fire areas in forested habitats	No immediate post-fire habitat or areas of extensive insect infestation proposed for treatment.
Common Loon (*Gavia immer*)	Large, clear lakes below 5,000 ft. in elevation with at least a partially forested shoreline	No suitable habitat exists in the project area for this species.
Harlequin Duck (*Histrionicus histrionicus*)	Shallow, swift streams in forested areas	Minor impacts to streams with potential breeding habitat.
Gray Wolf (*Canis lupus*)	Wide variety of habitats that are generally remote and isolated from human development; adequate populations of prey species, often wintering concentrations of deer or elk	No reduction in prey densities, increase in public motorized access, or disturbance to dens or rendezvous sites.
Northern Bog Lemming (*Synaptomys borealis*)	Bogs, fens and, wet alpine and sub-alpine meadows	No suitable habitat exists in the project area for this species.
Townsend's Big-eared Bat (*Corynorhinus townsendii*)	Caves, mines, and abandoned buildings	There is no suitable roosting habitat within or adjacent to proposed treatment areas.
Coeur d'Alene Salamander (*Plethodon vandykei idahoensis*)	Springs, seeps, spray zones	Suitable habitat may exist in the project area, but would not be affected.
Western Toad (*Bufo boreas*)	Adults occur in a variety of uplands. Breed in shallow ponds, lakes, or slow moving streams	Breeding habitat is present within the area of interest, but would not be impacted.

The following table summarizes the wildlife species and wildlife habitat components analyzed in more detail, the rationale for analysis (and conditions that influence the scope of analysis), and a brief description of their habitats.

Table 2. Wildlife species analyzed in detail

Species	Preferred Habitat	Rationale for Detailed Analysis
Threatened and Endangered Species		
Canada Lynx (*Lynx canadensis*)	Higher elevation spruce/ fir forests with adequate prey base of snowshoe hares, its primary food	The project is within designated lynx analysis units (LAUs) and potentially affects lynx habitat.
Grizzly Bear (*Ursus arctos horribilis*)	Habitat generalist; denning areas isolated and remote from human development	The project is within the Cabinet-Yaak Recovery Area and would result in effects to core habitat and changes to road densities.
Sensitive Species		

Species	Preferred Habitat	Rationale for Detailed Analysis
Fisher (*Pekania [Martes] pennanti*)	Mesic mature forest habitats	Potentially suitable denning and foraging habitat is present and may be impacted within the analysis area.
Flammulated Owl (*Otus flammeolus*)	Mature or old growth ponderosa pine and Douglas-fir forest	Potentially suitable nesting/roosting habitat may be affected. Proposed activities expected to trend other capable habitat toward suitability.
Pygmy Nuthatch (*Sitta pygmaea*)	Ponderosa pine habitat, especially mature and old growth stands	
Fringed Myotis (*Myotis thysanodes*)	Caves, mines, and abandoned buildings; large snag habitat in dry-site forest	

Resource Indicators and Measures

Potential effects, by relevant species, were identified and categorized as discussed in the "Species Screen" section based on habitat relationships, scientific literature on effects associated with vegetation management, and the proposed alternatives. Measurement criteria are based on the types of potential effects, scientific literature, the nature of the proposal, and applicable data. The table below displays the indicators that were used to measure effects on wildlife species. Indicators for each species vary and are based on those factors that could result in measurable effects (positive or negative) to the species. For most species being analyzed, appropriate habitat parameters were measured to distinguish potentially suitable habitat (specific parameters for individual species are discussed in the "Methodology" section for each species analyzed). A discussion of the changes in potentially suitable habitat for each relevant species and the effects on species are disclosed in the "Environmental Consequences" subsections.

Table 3. Resource indicators and measures for assessing effects

Species	Resource Indicator	Measure	Used to address: P/N, or key issue?	Source
Canada lynx	• amount of lynx habitat in a LAU currently in a stand initiation structural stage that does not yet provide winter snowshoe hare habitat • amount of lynx habitat regenerated in the previous 10-year period • impacts to multi-storied mature or late-successional forests • amount of lynx habitat in a stand initiation structural stage currently providing winter snowshoe hare habitat affected by thinning	Acres of regeneration harvest, commercial thin or precommercial thinning, or stand-replacing burn in lynx habitat	Yes	Northern Rockies Lynx Management Direction (USDA Forest Service 2007)
Grizzly bear	Grizzly bear habitat effectiveness	Changes to core, open and total motorized route densities (% of BMU)	Yes	Motorized Access Management Direction (USDA Forest Service 2011

Fisher	Changes to potentially suitable denning habitat, changes to mature forest habitat, effects on large snag habitat, changes in linear road miles	Acres harvested in potentially suitable or mature stands, drivable road miles	No	n/a
Flammulated owl / Pygmy nuthatch / Fringed myotis	Changes to dry forest habitat (including large snags) and trend toward suitable habitat conditions	Acres harvested in dry-site stands	Yes	n/a

Methodology

The appropriate methodology and level of analysis needed to determine potential effects is influenced by a number of factors, including the purpose and need for the proposal, the nature of the proposal, various regulations and policies, the potential for impacts, the risk to resources and species, and the information necessary for an informed decision. The National Environmental Policy Act (NEPA) directs the agency to focus on a full and fair discussion of significant issues, and identify and eliminate from detailed study the issues that are not significant. The methodology for the wildlife analysis was developed and conducted based on consideration of the above factors and others (e.g., available data).

There is some level of uncertainty associated with any analysis methodology: habitat associations are complex, some variables may be unknown or not described, and available data may not be as specific as that used in the scientific literature. However, this analysis is based on the most applicable scientific literature and uses the best available data. This information was validated, updated, and augmented by field reviews, habitat surveys, interpretation of aerial imagery, and reasonable assumptions based on present management conditions, professional judgment, and the combined knowledge of people from various sources (e.g., wildlife managers, other Forest Service employees, public input, private land management entities). The methodology is commensurate with the existing knowledge, existing data, and the risks associated with the proposal. The analysis allows for a comparison of potential effects by alternative and a decision based on environmental consequences.

The Council on Environmental Quality (40 CFR 1502.2) directs that impacts be discussed in proportion to their significance. Some wildlife species require a detailed analysis and discussion to determine effects. Others may not be impacted, impacted at a level that is inconsequential, or impacts are adequately avoided or mitigated through the design of the project. Generally, these elements do not require a detailed discussion and analysis.

Past actions and events including timber harvest, wildfire, road and trail construction, fire suppression, and insect and disease outbreaks on the Bonners Ferry Ranger District have influenced the existing availability and distribution of wildlife habitat. All past, present, and reasonably foreseeable actions listed in table 4 were reviewed for their relevancy to the wildlife analysis and their potential effects on wildlife. Those actions vary in their potential for impacts on wildlife, the consequences of potential impacts, the measurability of effects, and how they are measured. Some actions may have impacts, but any measurable effects on wildlife are already factored into the analysis (for example, road maintenance is a present and reasonably foreseeable action that may contribute to disturbance levels, but is a part of the impacts measured by miles and density of motorized routes). Also, some actions occur at a level that does not have a measurable effect (such as cutting Christmas trees for personal use) or can't be quantified for measurement because of their random, unpredictable nature and the inability to predict their extent (e.g., access for fire suppression).

Finally, activities such as past timber harvest, wildfire and fire suppression, and insect and disease infestations may have substantially affected wildlife habitat, but these effects have resulted in the current

stand structure and composition and are incorporated into the discussion of current conditions (see "Affected Environment"). Since these effects have already been factored in, they would not incrementally add to the effects of the proposed actions in a measurable way. As a result, these past actions and events do not receive detailed discussion in the analysis of cumulative effects.

More specific discussions regarding the analysis methodology can be found in the sections on individual species.

Table 4. Past, present & reasonably foreseeable actions cumulatively affecting wildlife

Action	Past	Present	Reasonably Foreseeable	Discussed under cumulative effects*	Explanation
Timber harvest activities	X	X		**Yes (grizzly bear and Canada lynx only)**	Effects on habitat (e.g. forest structure and composition) of past timber harvest are measured in existing condition. Ongoing timber harvest for Twentymile Creek project is outside cumulative effects analysis area for all species except grizzly bear and Canada lynx. Ongoing timber harvest for Leonia Restoration project is outside cumulative effects analysis area for all species except grizzly bear.
Prescribed burning for site prep and fuels treatment	X	X		**Yes (grizzly bear only)**	Effects of past prescribed burning are factored into the existing condition. Scheduled prescribed burning (Twentymile and Leonia projects) is outside cumulative effects analysis area for all species except grizzly bear and Canada lynx, and would have insignificant effects on the latter.
Tree planting	X	X		No	Effects on habitat (e.g. forest structure and composition) of past planting are measured in existing condition. Habitat modifications and potential disturbance from planting in ongoing timber sale areas would be inconsequential.
Activities on private lands	X	X	X	**Yes (grizzly bear only)**	Potential effects are discussed for grizzly bear. Private lands comprise a negligible (about 50 acres) portion of the cumulative effects analysis areas for other species. Potential effects of private land activities would be localized and inconsequential.
Public activities: firewood gathering, driving, dispersed camping, snowmobiling, hunting, hiking, berry picking	X	X	X	**Yes**	Addressed in cumulative effects.

Action	Past	Present	Reasonably Foreseeable	Discussed under cumulative effects*	Explanation
Road construction	X			No	Effects on open roads and total road miles from past road construction are factored into existing condition.
Road decommissioning/storage	X	X		**Yes (grizzly bear only)**	Effects on open road miles from past road decommissioning are factored into existing condition. Ongoing road storage for Twentymile and Leonia projects would affect the baseline condition for grizzly bear, but would have inconsequential impacts on Canada lynx, and is outside cumulative effects analysis area for other species.
Road maintenance	X	X	X	No	Potential effects are measured by open road miles.
Wildfires	X		Unknown	No	Effects of past wildfires on habitat have been factored into the existing condition.
Fire suppression	X	X	Unknown	No	Effects on habitat (e.g. forest structure, composition and snag numbers) from past suppression activities are factored into existing condition. Effects of potential future fire suppression are generally discussed under "No Action" alternative.
Spraying herbicides to control and prevent noxious weeds under the Bonners Ferry Noxious Weed Control Project EIS & IPNF Noxious Weed Treatment Project	X	X	X	No	This activity would not make appreciable habitat modifications. Potential disturbance effects would emanate from open roads, and would be localized and inconsequential.
Trail maintenance	X	X	X	No	Habitat modifications and potential disturbance as a result of trail maintenance would be inconsequential.
Railroad activities	X	X	X	No	Habitat modifications from past railroad construction and disturbance from use are factored into existing condition.
Abandoned mines and mining activities	X	X	X	No	Effects of past mining activities have been factored into the existing condition. Habitat modifications and potential disturbance from ongoing mining activities would be inconsequential.
North Zone Roadside Salvage EA		X		**Yes**	Addressed in cumulative effects.

Action	Past	Present	Reasonably Foreseeable	Discussed under cumulative effects*	Explanation
Clearing brush and trees to maintain helispots	X	X	X	No	Habitat modifications and potential disturbance as a result of this activity would be localized and inconsequential.
Radio and Telecommunication infrastructure maintenance on Black Mountain	X	X	X	No	No further habitat modification is expected at this site. All activities emanate from open road segments, so potential disturbance would be inconsequential.
Kootenai Starry Goat Project			X	**Yes (grizzly bear only)**	Potential effects are discussed for grizzly bear. Starry Goat Project is outside cumulative effects areas for other species.

* The effects of some actions are not measurable, are inconsequential at the scale of this analysis, and/or are captured by the existing condition as measured for other actions.

Spatial and Temporal Context for Effects Analysis

Geographic Scope

The geographic scope of potential effects on wildlife for this analysis was determined based on the spatial extent of proposed Federal actions. The proposed activities take place within the Boulder Creek drainage, east of Bonners Ferry, Idaho (figure 1).

The appropriate scale or geographic bounds for wildlife effects analysis varies on a species by species basis and may include review at multiple scales. Varying scales that were considered include the Boulder Creek watershed (about 40,578 acres – nearly all National Forest System lands); the Katka, Boulder and Grouse Canada Lynx Analysis Units (approximately 17,750, 17,380, and 15,869 acres, respectively); the Boulder Grizzly Bear Management Unit (about 62,369 acres), the Idaho Panhandle National Forests (2,500,000 acres), and the Northern Region of the Forest Service.

Direct, indirect, and cumulative effects were considered individually for each wildlife species and associated habitat to arrive at a final determination of effects. For those species unaffected by the proposal, additional analysis of cumulative effects was not necessary. The species' status, habitat conditions and population trends across the appropriate scales were reviewed to consider the potential effects from the project in concert with larger scale trends as well as national forest-level and regional-level goals.

Canada Lynx

For Canada lynx, the cumulative effects analysis areas are the Katka, Boulder, and Grouse Lynx Analysis Units (LAUs) (figure 1). Lynx Analysis Units were delineated following standards outlined within the Lynx Conservation Assessment and Strategy (LCAS; Ruediger et al. 2000) because they provide the appropriate scale at which specific lynx habitat parameters can be measured. Lynx analysis units are not intended to represent actual lynx home ranges, but their scale approximates the size of a female lynx home range (USDA Forest Service 2007).

Application of conservation measures at the lynx analysis unit scale allows blocks of quality lynx habitat to be maintained within each unit, which maintains a good distribution at the scale of a lynx home range as well as at a larger scale since the conglomeration of adjacent lynx analysis units would also maintain the appropriate levels of lynx habitat. The size of lynx analysis units would generally be from 16,000 to 25,000 acres in contiguous habitat, and likely be larger in less contiguous, poorer quality, or naturally fragmented habitat. The Northern Rockies Lynx Management Direction (NRLMD; USDA Forest Service 2007) superseded the LCAS by providing further direction on refining lynx habitat based on more recent research findings, and by defining risk factors for lynx.

The NRLMD also established standards and guidelines on how to address risk factors to reduce or eliminate impacts on lynx and their habitat. The NRLMD maintained the use of lynx analysis units as the appropriate scale at which to apply the standards and guidelines, as well as directing that lynx analysis units are the appropriate entity for which the potential effects to lynx and lynx habitat should be analyzed (USDA Forest Service 2007). Therefore, Standards and Guidelines from the NRLMD that address numeric thresholds (for example Standards VEG S1 and VEG S2) are measured at the lynx analysis unit level. Since all three LAUs contain relatively small amounts of forest in the early stand initiation structural stage – very little of which has been regenerated in the past 10 years – conducting analysis in a larger area would only serve to dilute project effects.

Although the BCRP also proposes activities outside LAUs, these activities are not expected to measurably impact lynx because these areas are assumed not to support reproducing populations of lynx, activities would not create barriers to lynx movement between LAUs, and lynx tolerate some level of human disturbance and do not appear to alter their behavior to avoid humans.

Grizzly Bear

The area selected for cumulative effects analysis for grizzly bears is the Boulder Grizzly Bear Management Unit (BMU) (figure 1). BMUs were originally created by the USFS in the early 1980s and later adopted by the U.S. Fish and Wildlife Service to roughly represent the size of a female grizzly bear home range (approximately 100 square miles in this ecosystem) containing all of the necessary seasonal habitat components. BMUs are the principal unit for evaluating and analyzing potential impacts on grizzly bears. BMUs do not represent actual home ranges, but are areas established for the purpose of grizzly bear analysis. Since the BMU is the standard reporting unit to annually assess motorized access conditions within recovery zones, evaluating road densities or core areas over a larger area would effectively mask the effects of project-level analysis.

Additionally, determination of motorized access conditions includes not only motorized routes within each BMU itself, but also routes on all ownerships for a specified distance around BMUs (500 meters for core analysis, 900 meters for road densities). Analyzing areas of a larger size with regards to core habitat and road densities (measures for Forest Plan Standards for grizzly bears) would add little to the analysis, and would dilute the impacts of project activities confined to less than two-thirds of the BMU. Further, the Motorized Access Management Direction (USDA Forest Service 2011a), which was incorporated into the 2015 revised land management plan, applies access management standards to individual BMUs within the respective recovery zones.

Other Species

For all other species analyzed, the Boulder Creek watershed was used as the cumulative effects analysis area. This area is approximately 40,578 acres, and is large enough to accommodate at least single home ranges for highly mobile species or to sustain the complete life cycle of most nonmigratory wildlife as well as breeding and nesting habitat for migrating birds.

Figure 1. Cumulative effects areas for wildlife species analyzed

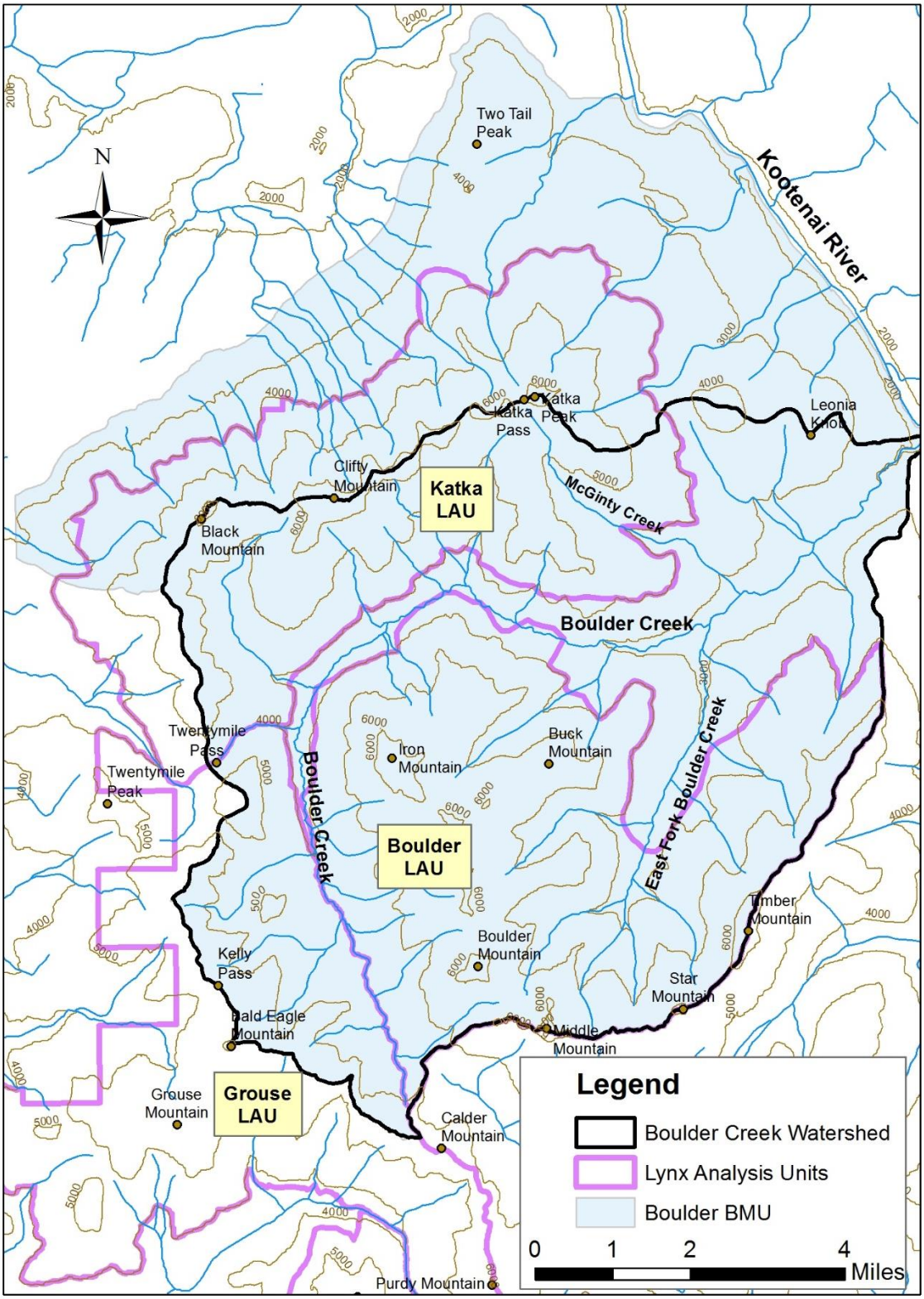


Table 5. Wildlife analysis scales for analyzing direct, indirect, and cumulative effects

Species	Cumulative Effects Analysis Area
Canada Lynx	Katka, Boulder, and Grouse Lynx Analysis Units
Grizzly Bear	Boulder Grizzly Bear Management Unit
All other species	NFS lands within the Boulder Creek watershed

Temporal Scope

The temporal scope of the analysis is a function of the nature of the proposal, the geographic scope of the analysis, ongoing management goals and actions, and natural events. The analysis assesses effects based on both existing conditions at the time of the analysis and potential conditions (e.g., capable habitat that may or may not be currently suitable) at some undetermined time in the future. The analysis will provide a representation of effects until, at some point in time, future unforeseeable actions or events result in appreciable change. The temporal scope of the analysis will be influenced by the location and nature of future management actions and natural events. The time period that disturbance from timber harvest may be present is expected to be from 5 to 8 years based on a 5-year timber sale contract and additional post-sale fuel treatments. Potential disturbance and habitat alteration from burn-only (non-harvest) units is expected to take place for up to ten years (under alternative 2). The effects of vegetation management from this project may be still apparent 50 or more years beyond this, barring other natural or artificial disturbance in the area.

Affected Environment and Environmental Consequences

Introduction

The distribution and abundance of wildlife is primarily a function of habitat conditions (i.e., vegetation type and successional stage). These conditions reflect inherent fixed attributes (as depicted in the description of capable habitat below) as well as disturbance (fire, windthrow, landslide, and insect outbreaks) types and frequencies. Wildlife species will occupy their preferred niche on the landscape, and move from place to place as forest structures change and different habitat conditions develop (Clark and Sampson 1995). Consequently, wildlife species will not necessarily persist indefinitely in areas where they are found today because of the dynamic and shifting environments in which they live. Given the often-conflicting habitat requirements of many species, a sound strategy for management is to maintain a complex pattern of forest types and age classes across the landscape that encourages biodiversity and emulates the historic patterns.

Ecological disturbances lay the foundation for landscape patterns and strongly influence wildlife populations. Disturbances that arise from natural processes or human actions can alter these landscape patterns and wildlife habitat, influencing wildlife abundance and composition. In addition to altering habitat due to direct impacts (timber harvest), humans can alter habitat indirectly by influencing natural disturbance patterns. For example, fire suppression results in changes in vegetation composition and structure and subsequent susceptibility to various natural disturbances.

In the absence of disturbance, vegetation follows a gradual and more predictable sequence of change called succession. As vegetation moves through each stage of succession, the composition of wildlife species shifts accordingly. Wildlife species have distinctive successional strategies. Some species are

more suited to the early stages of forest succession where grasses, forbs and shrubs dominate the site, while others are better suited for the later stages of forest development (e.g., old growth). Still other species are habitat generalists and have adapted to a wide array of successional stages.

The resource information provided, especially as it relates to habitat analysis, includes past actions and events that have influenced vegetative changes to what is now part of the existing condition. An important concept in the existing condition descriptions and analysis is the difference between capable habitat and suitable habitat:

> Capable habitat refers to the inherent potential of a site to produce essential habitat requirements of a species. The vegetative structure and composition on the site (such as stand age, cover type or stand density) may not currently provide the necessary attributes to support a species, but it has the fixed attributes that would enable it to provide those variables under appropriate conditions. Some examples of fixed attributes are slope, aspect, soil or elevation.
>
> Suitable habitat refers to wildlife habitat that currently has both the fixed and variable stand attributes meeting a given species' habitat requirements. Variable attributes change over time and may include stand age, cover type, stand density, tree size, or canopy cover. Suitable habitat may be identified based on its ability to currently provide suitable habitat for a limiting factor such as nesting habitat. Because it can be difficult to determine if currently unoccupied habitat contains **all** attributes necessary to meet a species' requirements (some of which may be difficult to measure, are not easily discernable, or are previously undocumented by research), stands that appear to contain the necessary habitat components based on habitat validation surveys are labeled as *potentially* suitable.

Characterization of Habitats

The BCRP wildlife analysis area is located in the northwestern portion of the Cabinet Mountain range, southwest of the Kootenai River. The area is characterized by high topographic relief, with elevations ranging from about 1,800 feet along the Kootenai River to 6,700 feet elevation on Clifty Peak.

Much of the upper portion of the Boulder Creek watershed was severely burned in the 1910 wildfire event. North of Boulder Creek (outside the watershed), large acreages were burned in 1889 and in 1926. In recent years, fire suppression has prevented wildfire from burning substantial portions of the watershed, and the largest fire in the drainage over the previous 20 years was the Pouch Creek Fire on Clifty Mountain in 2001 (less than 60 acres).

Vegetation includes mixed-conifer dry-site stands dominated by ponderosa pine, Douglas-fir and grand fir on south- and west-facing slopes at low and middle elevations; moist stands of western redcedar and western hemlock in stream bottoms and cooler aspects; and predominately cool and dry forests dominated by Engelmann spruce and subalpine fir at higher elevations. Lodgepole pine is conspicuous, and occasionally dominant, in stands spanning a broad elevational range that were regenerated in the 1910 fire.

Since the Boulder Creek/Katka Peak area is in relatively close proximity to the city of Bonners Ferry, portions were heavily logged and roaded from the 1970s through the 1990s. However, most of the non-arterial roads were gated starting in the 1980s to provide grizzly bear security, and a number of more permanent closures (road decommissioning and long-term storage) have further reduced this road system in recent years. Although still somewhat extensive, the area contains considerably fewer road miles than at the historic peak.

The Boulder Creek drainage typically receives moderate to heavy recreational use throughout the snow-free months due to proximity to Bonners Ferry, extensive trail network, sites of historic interest,

availability of dispersed camping, attractiveness as a hunting destination, and presence of an open road system that forms a drivable (although somewhat rugged) loop and traverses much of the length of Boulder Creek. However, most of the use is concentrated around open road segments, and backcountry areas (with the possible exception of Clifty Peak and Divide Lake) generally have a remote and undeveloped appearance. As a result, human presence is a possibility at backcountry locations during the summer and fall months, but is of a rather low likelihood.

Threatened and Endangered Species

Canada Lynx

Alternatives 2 and 3 propose regeneration harvest and burning of lynx habitat in the Boulder, Grouse, and Katka LAUs. These alternatives would not result in greater than 30 percent of lynx habitat in the affected LAUs being in the stand initiation structural stage not yet providing winter snowshoe hare habitat, or more than 15 percent of lynx habitat in the LAUs would having been regenerated by timber management within a 10-year period. There would be no project activities in mature, multi-story lynx habitat or precommercial thinning in lynx habitat under any of the proposed alternatives. All alternatives would be consistent with all standards and guidelines in the Northern Rockies Lynx Management Direction.

Habitat Relationships

Canada lynx is one of the three species of wild cats that occur in the temperate forests of North America. They occur in boreal, sub-boreal and western montane forests and are uncommon or absent from the wet coastal forests of North America. Distribution of lynx is nearly coincident with that of the snowshoe hare, its primary prey. Both snow conditions and vegetation types are important factors to consider in defining lynx habitat. Lynx habitat quality is believed to be lower in the southern periphery of its range because landscapes are more heterogeneous in terms of topography, climate, and vegetation (Ruediger et al. 2000).

Lynx habitat consists of a variety of forest ages and structural stages, including young regenerating forests and mature multi-storied forests that provide snowshoe hare habitat. Lynx require early successional forests that contain high numbers of prey (mainly snowshoe hare) for foraging and late-successional forests that contain cover (especially deadfalls) for kittens and for denning (Koehler and Aubrey 1994). The highest use occurs when these are in close proximity to one another. Like most wild cats, lynx require cover for security and stalking prey and avoid large open areas. Although lynx may cross openings less than 100 meters in width, they generally do not hunt in these areas (Koehler and Aubrey 1994). In northern Idaho and northwestern Montana, lynx generally occur in moist, cold habitat types above 4,000 feet elevation.

The Canada lynx was listed as threatened on March 21, 2000. Lynx populations in Alaska and most of Canada are generally considered stable to slightly dropping. The conservation of lynx populations is the greatest concern in the western mountains of the United States because of the peninsular and disjunct distribution of suitable habitat at the southern periphery of the species' range. Both historic and recent lynx records are scarce, which makes identifying range reductions and determining the historical distribution of stable populations difficult (Koehler and Aubrey 1994).

Identified risk factors that can impact lynx populations mainly address alteration of forest habitats. Upon listing, lynx habitat management on Federal lands was guided by the Canada Lynx Conservation Assessment and Strategy (LCAS) (Ruediger et al. 2000). The LCAS directed agencies to delineate lynx analysis units to evaluate and analyze effects of planned and on-going projects on lynx and their habitat, and provided recommendations for management within these habitats. In 2007, based on the recommendations of the LCAS and more recent research findings, the Forest Service adopted the

Northern Rockies Lynx Management Direction (NRLMD) (USDA Forest Service 2007), which provides lynx management standards and guidelines that were incorporated into existing forest plans. This direction was subsequently retained in the Revised Land Management Plan for the IPNF (USDA Forest Service 2015) and associated Biological Opinion (USDI Fish and Wildlife Service 2013).

Affected Environment

At the time of Federal listing, Canada lynx primary habitat in North Idaho was broadly characterized to include areas with site potential to produce subalpine fir, mountain hemlock, Western hemlock, cedar, and moist grand fir climax habitats (USDI Fish and Wildlife Service 2000). Dry forest communities (ponderosa pine and Douglas-fir habitat types) and upper subalpine habitat types (alpine larch and whitebark pine cover types) were not considered lynx habitat. As the available knowledge of lynx habitat requirements has increased, lynx habitat on the Idaho Panhandle National Forests has been more narrowly defined to include only subalpine fir/Engelmann spruce habitats (primary habitat except on the Priest Lake Ranger District, where moist cedar-hemlock is also considered primary vegetation) and cool/moist habitat types occurring adjacent to primary habitat to create a transition between lynx habitat and areas that are not lynx habitat (Ruediger et al. 2000, Ruggiero et al. 2000, USDA Forest Service 2007). Based on research findings, the distance recommended by the Canada Lynx Biology Team and agreed upon by IPNF biologists during remapping discussions was that this transition zone is generally limited to secondary habitat within 200 meters of primary habitat (USDA Forest Service 2013a).

The Northern Rockies Lynx Management Direction (USDA Forest Service 2007) contains four standards for vegetation management, all of which were derived directly or indirectly from the Lynx Conservation Assessment and Strategy:

1. In an effort to mimic historic landscape patterns of age class distribution and patch sizes and to limit disturbance at the LAU level, Standard VEG S1 was developed. This standard dictates that if more than 30 percent of the lynx habitat in a lynx analysis unit is currently in a stand initiation structural stage that does not yet provide winter snowshoe hare habitat, no additional habitat may be regenerated by vegetation management projects.

2. To retain adequate snowshoe hare (lynx foraging) habitat over time, Standard VEG S2 limits timber management projects so that they do not regenerate more than 15 percent of lynx habitat on National Forest System lands within a lynx analysis unit in a 10 year period.

3. Precommercial thinning has been identified as a risk factor for lynx because it has the potential to reduce winter snowshoe hare habitat in young, regenerating forests. While recent research indicates that lynx spend relatively little time hunting in these juvenile stands during winter in the Northern Rockies (Squires et al. 2010, Squires et al. 2006), they likely serve as source habitats for snowshoe hare populations. Precommercial thinning in these stands may reduce the inherent capacity of the habitat to produce snowshoe hares. As a result, Standard VEG S5 directs that precommercial thinning projects that reduce snowshoe hare habitat may not occur from the stand initiation structural stage until the stands no longer provide winter snowshoe hare habitat, with some exceptions.

4. Research indicates that multi-storied mature or late-successional forests are important to snowshoe hare populations and, subsequently, to lynx (USDA Forest Service 2007, USDI Fish and Wildlife Service 2007, Squires et al. 2010). Mature and late successional forests may provide more stable habitat for a longer time period compared to early successional forests; provide habitat for red squirrels, an important secondary prey species (Buskirk et al. 2000); and also provide consistent and dependable winter snowshoe hare habitat. Winter habitat may be the most limiting for lynx, since starvation mortality is more common during this season and lynx use a

narrower range of available habitat than in summer (Squires et al. 2010). Standard VEG S6 prohibits vegetation management that reduces snowshoe hare habitat in these stands, except for under specific circumstances or for fuels treatment projects within the wildland urban interface.

Other Northern Rockies Lynx Management Direction guidelines were developed to address lynx habitat components that are now considered less essential, or not limiting on the landscape. Guideline VEG G11 is based on the general consensus of lynx researchers that denning habitat, in most cases, is not limiting in lynx habitat. This stems from research in northwest Montana that has found lynx use a variety of conditions for den sites, and used young regenerating forests as well as mature forests (USDA Forest Service 2007). The key component for lynx den sites appears to be the presence of down woody debris, rather than stand age. Since most of the national forests affected by the Northern Rockies Lynx Management Direction (including the Idaho Panhandle) have existing direction to provide old growth and retain dead and down material, denning habitat is not considered a limiting factor.

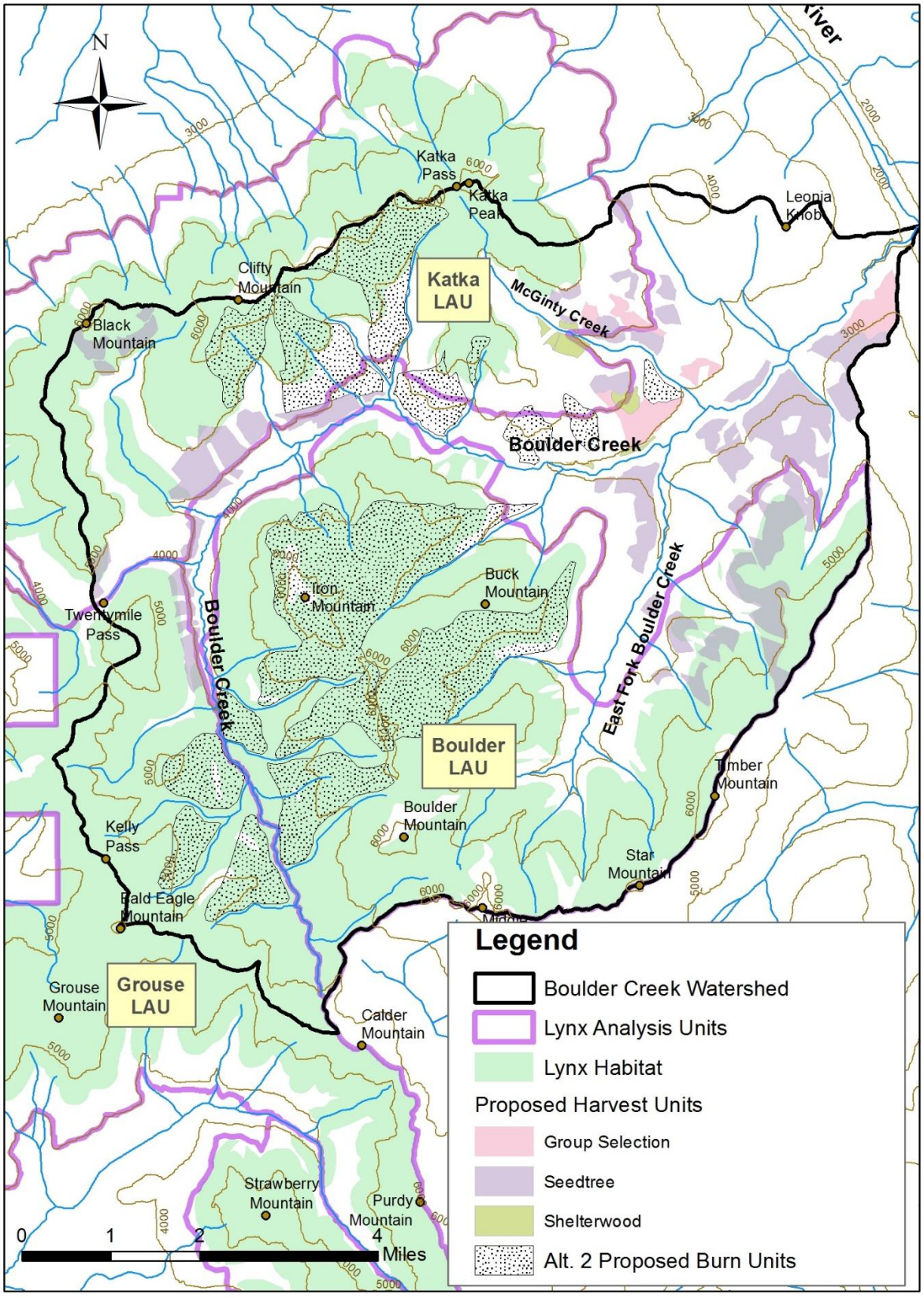
Likewise, road density does not appear to affect lynx habitat selection (Ruediger et al. 2000). Lynx may tolerate some level of human disturbance (including roads), and most research indicates that lynx do not alter their behavior to avoid humans (Aubry et al. 2000, McKelvey et al. 2000, Mowat et al. 2000). Lynx may use little-traveled roadways for travel and foraging in good snowshoe hare habitat, but they prefer to move through continuous forests frequently using ridges, saddles and riparian areas (Ruediger et al. 2000). It is possible that the road construction associated with historic timber sales may have resulted in long-term negative impacts to lynx through increased access for trappers. Trapping can be a substantial source of mortality in areas where lynx are legally trapped (Canada and Alaska) (Koehler and Aubry 1994), and some level of incidental take from traps meant for other species occurs even though intentional lynx harvest has been illegal in Idaho since 1996.

Critical habitat has been designated for Canada lynx on the Idaho Panhandle National Forests to include virtually all of the American-Canuck and Deer-Skin Lynx Analysis Units (USDI Fish and Wildlife Service 2014). No critical habitat is present in the BCRP area.

The project would take place within the Boulder, Grouse and Katka LAUs (figure 2), which are each analyzed separately. Currently, the Boulder and Grouse LAUs both contain less than one percent of lynx habitat in the early stand initiation structural stage not yet providing lynx habitat (Standard VEG S1), while the Katka LAU contains about 349 acres (3.6 percent) in this stage (table 6). The Katka value includes approximately 272 acres (2.8 percent) regenerated on National Forest System lands in the previous 10 years (Standard VEG S2) through activities associated with the ongoing Twentymile Creek Project.

Lynx presence has been historically reported throughout the Idaho Panhandle, including both verified and unverified sightings on the North Zone of the IPNF (Bonners Ferry, Priest Lake and Sandpoint Ranger Districts). From 2010-2014, focused surveys detected five individual lynx on the North Zone. This includes three individuals in the Purcell Mountains, one in the Selkirks, and one in the west Cabinet Mountains (Lucid et al. 2016). The west Cabinet individual was unintentionally captured, and later released fitted with a radio-collar, in the Twentymile Creek area of the Bonners Ferry Ranger District immediately west of the project area. These surveys also detected 18 lynx in the Purcells and one lynx in the west Cabinets that were not identifiable to individual. Despite the limited number of verifiable sightings in the area, lynx analysis units have been designated to serve as the fundamental units for measuring Canada lynx recovery. Therefore, within lynx analysis units, lynx presence is assumed and the appropriate management emphasized.

Figure 2. Boulder Creek Restoration Project proposed activities in relation to Lynx Analysis Units and lynx habitat



Environmental Consequences – *Canada Lynx*

Methodology

After initial identification by the vegetation response unit model, lynx habitat was further evaluated using data from timber stand examinations and field evaluations. Stand exams were used to identify stands in the stand initiation structural stage that do not yet provide winter snowshoe hare habitat – the only vegetation stage for which the Northern Rockies Lynx Management Direction contains numeric standards (VEG S1 and VEG S2). On the Idaho Panhandle National Forests, this stage is identified as from stand initiation up to approximately 16 years old, depending on forest type (USDA Forest Service 2013b). Since current law mandates certification of regeneration following timber harvest, the status of regeneration of harvested units is closely monitored by Forest Service personnel. Thus, the timber stand database accurately reflects the amount of habitat in this stage.

In 2013 and 2014, Forest Service wildlife personnel conducted habitat evaluation surveys on approximately 3,540 acres of potential lynx habitat in the Boulder Creek Project area in 43 distinct stands, including all stands encompassing proposed harvest units.

To fully analyze and disclose the potential effects to Canada lynx, this analysis first focuses on the specifics of each of the proposed alternatives and their effects to lynx and their habitat. With those discussions as background, the analysis then addresses the proposed alternatives in relation to compliance with the Forest Plan, including standards and guidelines of the Northern Rockies Lynx Management Direction.

Alternative 1 - Direct, Indirect and Cumulative Effects

In the absence of mechanical treatments, habitat conditions would continue to change in the lynx analysis unit. Lodgepole pine is eventually expected to die off and be replaced by subalpine fir and Engelmann spruce in most lynx habitat stands. This may be a slow process; and in the meantime insects, disease and competition for sunlight and nutrients would continue tree mortality and trigger increases in down woody material. More lynx denning habitat would likely be produced, and existing denning habitat would be enhanced. The occasional mature, multi-storied stand would likely improve, while some winter snowshoe hare habitat would move out of the stand initiation stage and lose its value as preferred hare habitat.

The scenario described above assumes that there would be no stand-replacing fire in this area. Given the history of active fire suppression and existing high fuel loads in many stands, it is reasonable to assume that the area would be affected by wildfire at some point in the future. While the action alternatives would not remove the risk of wildfire, they would reduce fire severity in and around treated stands (see Fire Report). The magnitude of any potential fire would depend upon area accessibility, available suppression resources, weather and other environmental factors. A mixed-severity fire would not likely alter large portions of available habitat, but a large stand-replacing fire would convert mature stands to a stand initiation phase, which may take 20 or more years to mature to the point where they could support high densities of snowshoe hares.

Continued fire suppression has the potential to prevent lynx habitat from reaching an early successional structural stage that would support high densities of snowshoe hares in subsequent years. The amount of future fire and level of successful suppression is impossible to predict, but would generally result in the effects described above.

Alternative 1 would not have any direct or indirect effects on lynx or lynx habitat in the affected LAUs, although habitat would continue to change as described above. Since there would be no measurable effects from this alternative, there would be no cumulative effects.

Direct and Indirect Effects Common to Alternatives 2 and 3

Alternatives 2 and 3 propose regeneration harvest on a total of approximately 743 acres of lynx habitat in the three affected LAUs: 504 acres in the Boulder LAU, 41 acres in the Grouse LAU, and 198 acres in the Katka LAU (table 6). The remaining harvest acres are either outside of LAUs (1,766 acres), or in non-lynx habitat (i.e., not subalpine fir/Engelmann spruce or cool/moist habitats adjacent to it) within LAUs (924 acres). Regeneration harvest would contribute to both Standard VEG S1 (amount of lynx habitat in the lynx analysis unit in a stand initiation structural stage that does not yet provide winter snowshoe hare habitat) and Standard VEG S2 (amount having been converted within the previous ten years). Affected stands are expected begin to provide high quality winter snowshoe hare habitat within approximately 16 to 20 years following treatment.

Table 6. Existing condition, proposed treatment acres, and post-implementation condition of LAUs included in the Boulder Creek Restoration Project

		Lynx Analysis Unit (LAU)		
		Boulder	**Grouse**	**Katka**
Lynx Analysis Unit (acres)		17,380	15,869	17,750
Potential lynx habitat (acres)		14,221	12,320	9,762
Existing condition of LAUs	Stand initiation structural stage (acres (%))[1]	95 (0.7)	5 (<0.1)	349 (3.6)
	Regenerated by timber management in past 10 years (acres (%))[2]	0	0	272 (2.8)
Proposed treatments	Regeneration harvest (acres)[3]	504	41	247
	Burn only (acres)[4]			
	Alternative 2	3,978	843	1,194
	Alternative 3	99	0	0
Post-implementation condition of LAUs	Stand initiation structural stage (acres (%))[1]			
	Alternative 2	1,594 (11.2)	257 (2.1)	895 (9.2)
	Alternative 3	624 (4.4)	46 (0.4)	596 (6.1)
	Regenerated by timber management in past 10 years (acres (%))[2]	504 (3.5)	41 (0.3)	519 (5.3)

[1]acres/percentages counted toward Northern Rockies Lynx Management Direction (USDA Forest Service 2007) standard VEG S1

[2]acres/percentages counted toward Northern Rockies Lynx Management Direction (USDA Forest Service 2007) standard VEG S2

[3]analysis assumes that all regenerated acres revert to stand initiation structural stage

[4]analysis assumes that approximately 25 percent of total burn area would revert to stand initiation structural stage

Adequacy of NRLMD standards has recently come into question when compared to results of recently published research (Kosterman 2014). However, the manner in which vegetation was classified in the thesis does not readily lend itself to comparison with NRLMD standards. The optimum amount of young forest (10-15%) identified in the thesis appears to be a subset of the vegetation types used to formulate the 30% (VEG S1) standard in the NRLMD, and the mature forest vegetation class described in the thesis (which identifies greater that 50% available in lynx home ranges) appears to include a large range of mature forest structural types that may or may not provide quality habitat for snowshoe hare. Even so, the cumulative effects of the BCRP would result in less than 12 percent early successional habitat in the Boulder LAU, and the Grouse and Katka LAUs would remain below the range suggested by Kosterman (2014).

The areas of lynx habitat proposed for treatment represent a variety of forest types and conditions. Much of it contains a dominant lodgepole pine overstory in a stem exclusion condition (i.e., there is little conifer regeneration or shrub development). The remainder are mixed-conifer stands in which the conifer understory (seedling- and sapling-sized trees) is sparse or lacking.

There would be no project activities in mature, multi-story lynx habitat or areas capable of achieving this stage within the next 10 to 20 years. No precommercial thinning would occur in lynx habitat in this proposal. Approximately 308 acres of precommercial thinning are proposed within LAUs (72 acres in Boulder, 235 acres in Katka). Although within the LAU boundaries, these acres are not considered lynx habitat based on the site potential and characteristics of the stand (as described in "Affected Environment" section). Therefore, the precommercial thinning of these acres would not negatively impact lynx or their habitat. As a result, all alternatives would be consistent with NRLMD Standards VEG S5 and VEG S6.

Although large openings (up to several hundred acres) would be created by regeneration harvest under both action alternatives, they would not substantially impede lynx movement within or between LAUs because numerous retention (leave) areas, riparian buffers, and other stands not recently harvested would continue to provide forested travel corridors. As discussed in the Affected Environment section, lynx tolerate some level of human disturbance and do not appear to alter their behavior to avoid humans. Consequently, the disturbance created by the proposed harvest would not be expected to greatly affect lynx behavior or movement. Similarly, timber harvest and precommercial thinning in areas outside LAUs would have little (if any) effect on lynx since they are low-elevation sites that are assumed not to support reproducing populations of lynx due to lack of boreal forest habitat.

Approximately 99 acres of prescribed burning of lynx habitat (no harvest) are common to alternatives 2 and 3. This portion of burn unit 12 outside the inventoried roadless area consists of predominantly lodgepole pine overstory with small (1-5 acres) openings on the upper (southern) end. This burn is intended to enlarge these openings, as well as creating other openings in the lodgepole overstory. Effects to lynx would be minor, as no mature multistoried habitat would be affected, and only a small (less than 30 acres) amount of the Boulder LAU is expected to be converted to early successional habitat in this burn area.

The project also proposes creating an approximately 22-acre fuel break immediately downslope of the site where the historic Black Mountain lookout is to be relocated. This stand is currently dominated by pole-sized (less than 10-inch) lodgepole pine with a patchy understory of lodgepole pine, subalpine fir and spruce that does not provide high horizontal cover due to lack of branches near the ground. Since it lacks both overstory cover and dense regenerating conifer understory, it does not provide high quality hare habitat in either the mature multistory or early successional stages. As a result, slashing small trees and cutting tall brush would have only minor effects to snowshoe hare cover and would be compliant with NRLMD standards VEG S5 and VEG S6.

All three of the affected LAUs contain abundant amounts of mature (but not necessarily mature multi-storied) forest in lynx habitat that is well-distributed throughout. Because of this abundance, and with a minimal amount of denning habitat being potentially affected, it can reasonably be expected that they would contain sufficient amounts of denning structures after project implementation under the action alternatives.

Invasive plant (weed) treatments would occur along roads, trailheads, and other disturbed areas. This activity could inadvertently reduce hare habitat (shrubs) in treated areas, but would affect an inconsequential amount of lynx habitat.

As discussed above, road density does not appear to affect lynx habitat selection and lynx are tolerant of some level of human disturbance. However, access via roads may increase the mortality risk to lynx from incidental trapping. The reduction of seasonally restricted road miles would reduce potential incidental trapping mortality for this species since trappers would be less likely to access these areas. The conversion of FSR 1304G to a non-motorized trail would have no effect on Canada lynx because the actual condition would remain essentially unchanged.

Alternative 2 Direct and Indirect Effects

Alternative 2 proposes approximately 5,916 more acres of prescribed burning in lynx habitat than alternative 3 (6,015 acres compared to 99 acres). This includes approximately 3,978 acres in Boulder LAU, 843 acres in Grouse LAU, and 1,194 acres in Katka LAU.

Large portions of the proposed burn units that are in lynx habitat contain a continuous shrub layer with inclusions of mature or immature conifers on approximately 15 percent of the area. This shrub layer mainly consists of Rocky Mountain maple and alder in open areas, and menziesia and huckleberries where conifer overstory is present. Frequently, the shrub layer is tall, decadent, and prevents dense conifer regeneration. Where mature conifers are present (usually subalpine fir or Engelmann spruce), they are either found in small (less than 5-acre), dense clumps; or are widely spaced and do not provide a continuous overstory canopy. Because of the restricted presence of dense conifer stands, and the open structure with limited conifer regeneration elsewhere, it is unlikely that the large majority of these burn units represent high quality yearlong foraging (snowshoe hare) habitat since they lack a dense understory of vegetation that would provide forage for snowshoe hare, particularly in winter.

All or portions of several other proposed burn units have a more continuous conifer overstory dominated largely by lodgepole pine (resulting from the 1910 fires) with a shrub understory and limited conifer regeneration. Similarly, these areas likely do not provide high-quality hare habitat in the winter. The remaining areas to be burned – both within and outside of the LAUs – consist of dry or moist forest more than 200 meters removed from boreal forest types, and do not represent lynx habitat.

The intent is to burn large portions of the open shrubfields – limiting or reversing the encroachment of conifers in the process. In lodgepole pine-dominated stands, the intent is to create openings by running mixed-severity fire in through them. The small inclusions of large diameter spruce-fir stands would not be greatly affected since they would not be intentionally ignited, and they would be more shaded than surrounding brushfields and would not burn as readily.

It is estimated that approximately 25 percent of the timbered areas within burn units would experience high-severity fire (see Fuels Report) that would revert them to the stand initiation structural stage. This would convert about 995 acres of lynx habitat in the Boulder LAU (25 percent of 3,978 acres), about 211 acres in the Grouse LAU (843 acres in burn units), and approximately 299 acres in the Katka LAU (1,194 acres in burn units) to the stand initiation stage. These acres would count toward standard VEG S1, and would result in 11, 2, and 9 percent of the lynx habitat in an early successional stage in the Boulder,

Grouse and Katka LAUs, respectively (table 6). Since these acres would not be regenerated by timber management (i.e. harvest), they would not count toward standard VEG S2. As a result, all three affected LAUs would meet the standards of no more than 30 percent of lynx habitat in an LAU in the stand initiation structural stage (VEG S1) and no more than 15 percent of the LAU converted to this stage within the last 10 years (VEG S2).

Cumulative Effects Common to Alternatives 2 and 3

The following past, ongoing and reasonably foreseeable actions were considered in a cumulative effects discussion for Canada lynx:

Public Activities - Personal use firewood gathering, dispersed camping, wheeled vehicle use, and most forms of non-motorized recreation would not significantly impact Canada lynx as these activities would result in inconsequential changes to forest structure, and lynx are not particularly vulnerable to human disturbance (Aubry et al. 2000, McKelvey et al. 2000, Mowat et al. 2000). With respect to over snow motorized vehicle use, while there is a lack of evidence that packed snow trails facilitate competition with other predators, there is evidence that competing predators use packed trails, suggesting a potential effect on individual lynx (USDA Forest Service 2007). This proposal would not increase over-snow motorized vehicle use above current levels, and may reduce this use when currently drivable roads are placed into long-term storage. Similarly, the risk of trapping mortality would not increase as a result of this proposal. Since none of the alternatives propose increases in motorized route density, additional cumulative impacts from incidental trapping and snowmobile use are not expected.

North Zone Roadside Salvage – This project proposes salvage logging of standing dead, down and live hazard trees within 200 feet of the shoulder, and road maintenance work that includes cutting and removal of utilizable brush and trees within the maintenance clearing limits (10-20 feet off road shoulders), ditch work, relief pipe and culvert cleaning or replacements, spot graveling and blading. The proposed activities would take place along roads currently open to public use. Roadside salvage would not affect lynx habitat in any of the LAUs included in the BCRP. Approximately 20 acres of roadside maintenance are proposed within the Katka LAU, and none in the Boulder or Grouse LAUs. Therefore, changes to lynx habitat from this project would be inconsequential.

Twentymile Creek Project – The Twentymile Creek project will harvest timber on approximately 319 acres of lynx habitat (272 of which are regeneration harvest) and about 532 acres on non-lynx habitat in the Katka LAU. The project also includes precommercial thinning (PCT) within the WUI on about 239 acres in the Katka LAU along with about 37 acres in the Grouse LAU. Combined effects to the Katka LAU from the Twentymile Creek Project and BCRP as they relate to NRLMD standards VEG S1 and S2 are reflected in table 6, above. Precommercial thinning of approximately 276 acres of lynx habitat would potentially have an adverse effect on lynx, but any take associated with this activity was previously analyzed and exempted during formal consultation on the Northern Rockies Lynx Management Direction (USDI Fish and Wildlife Service 2007).

Conclusion

Alternatives 2 and 3 propose regeneration harvest on a total of approximately 743 acres of lynx habitat distributed across the Boulder, Grouse, and Katka LAUs. Additionally, alternative 2 proposes prescribed burning on approximately 5,916 acres of lynx habitat that could regenerate up to an additional 1,480 acres. Alternative 3 proposes burning of only about 99 acres of lynx habitat. All alternatives would be consistent with all standards and guidelines in the Northern Rockies Lynx Management Direction (see below). The action alternatives would not result in greater than 30 percent of lynx habitat in the affected LAUs being in the stand initiation structural stage not yet providing winter snowshoe hare habitat, or more than 15 percent of lynx habitat in the LAUs would having been regenerated by timber management

within a 10-year period. There would be no project activities in mature, multi-story lynx habitat or precommercial thinning in lynx habitat under any of the proposed alternatives.

Openings created by the proposed timber harvest and burning would not substantially impede lynx movement within or between LAUs, and all three of the affected LAUs would continue to provide adequate denning habitat following implementation. The reduction of road miles (road storage) may reduce potential trapping mortality for lynx, and other proposed project activities would have minor effects to lynx habitat. Potential disturbance created by project activities is not expected to meaningfully affect lynx behavior or movement.

A complete list of Northern Rockies Lynx Management Direction Standards and Guidelines and demonstrated project compliance can be found below. Effects determinations and rationale for the final project decision can be found in the Wildlife Biological Assessment included in the project file.

Consistency with the Forest Plan

Standards and Guidelines in the Northern Rockies Lynx Management Direction (USDA Forest Service 2007) were retained in the 2015 revised Land Management Plan (USDA Forest Service 2015). All alternatives are consistent with this document.

Relevant Standards and Guidelines from the Northern Rockies Lynx Management Direction are addressed as follows:

Standard ALL S1: *New or expanded permanent development and vegetation management projects must maintain habitat connectivity in an LAU and/or linkage area*.

> Proposed timber harvest and burning are not expected to noticeably disrupt animal movement through the affected LAUs or linkage areas. There would be multiple forested stands remaining untreated throughout the vicinity of the treatment units that would maintain a contiguous forested corridor and continue to provide ample opportunity for lynx movement through this area. All alternatives would comply with Standard ALL S1.

Standard LAU S1: *Changes in LAU boundaries shall be based on site-specific habitat information and after review by the Forest Service Regional Office.*

> LAU boundaries on the Idaho Panhandle National Forests (IPNF) were refined based on the best available science of what constitutes lynx habitat, more accurate habitat mapping, and multiple discussions with members of the interagency Canada Lynx Biology Team and a review by the Forest Service Regional Office. See USDA Forest Service (2013b) for detailed information regarding the process of remapping LAU boundaries on the IPNF. Consequently, previous remapping of LAU boundaries on the IPNF complies with Standard LAU S1.

Standard VEG S1: *Unless a broad scale assessment has been completed that substantiates different historic levels of stand initiation structural stages limit disturbance in each LAU as follows: If more than 30 percent of the lynx habitat in an LAU is currently in a stand initiation structural stage that does not yet provide winter snowshoe hare habitat, no additional habitat may be regenerated by vegetation management projects.*

> All three of the affected LAUs (Boulder, Katka and Grouse) currently contain small amounts of lynx habitat in the stand initiation structural stage. Neither action alternative, in combination with ongoing and reasonable foreseeable activities, would raise the amount of habitat in this stage to more than 11 percent for any of these LAUs (table 6). Consequently, all alternatives would comply with Standard VEG S1.

Standard VEG S2: *Timber management projects shall not regenerate more than 15 percent of lynx habitat on NFS lands within an LAU in a ten-year period.*

No more than five percent of any of the affected LAUs would have been regenerated by timber management projects under the proposed alternatives. Consequently, all alternatives would comply with Standard VEG S2.

Standard VEG S5: *Precommercial thinning projects that reduce snowshoe hare habitat may occur from the stand initiation structural stage until the stands no longer provide winter snowshoe hare habitat only: 1) within 200' of administrative sites, 2) for research studies or genetic tree tests evaluating genetically improved reforestation stock, 3) based on new information that is peer reviewed and accepted by the regional level of the Forest Service, and state level of FWS, where a written determination states that a project is not likely to adversely affect lynx or that a project is likely to have short-term adverse effects on lynx or its habitat, but would result in long-term benefits to lynx or its habitat, 4) for conifer removal in aspen, or daylight thinning around individual aspen trees, where aspen is in decline, 5) for daylight thinning of planted rust-resistant white pine where 80% of the winter snowshoe hare habitat is retained, or 6) to restore whitebark pine.*

No precommercial thinning is proposed in lynx habitat under any of the alternatives in the BCRP. Therefore, all alternatives are in compliance with Standard VEG S5.

Standard VEG S6: *Vegetation management projects that reduce snowshoe hare habitat in multi-story mature or late successional forests may occur only: 1) within 200' of administrative sites, 2) for research studies or genetic tree tests evaluating genetically improved reforestation stock, 3) for incidental removal during salvage harvest (e.g. removal due to location of skid trails).*

Fuel treatment projects within the WUI that do not meet Standards VEG S1, VEG S2, VEG S5 and VEG S6 shall occur on no more than 6 percent (cumulatively) of lynx habitat on each administrative unit (a unit is a National Forest).

No project activities would occur in multi-story mature or late-successional forests under any of the proposed alternatives. Therefore, all alternatives would comply with Standard VEG S6.

Standard LINK S1: *When highway or forest highway construction or reconstruction is proposed in linkage areas, identify potential highway crossings.*

There is no highway or forest highway construction or reconstruction proposed under any of the alternatives. Consequently, all alternatives would comply with Standard LINK S1.

Guideline ALL G1: *Methods to avoid or reduce effects on lynx should be used when constructing or reconstructing highways or forest highways across Federal land. Methods could include fencing, underpasses, or overpasses.*

There is no highway or forest highway construction or reconstruction proposed under any of the alternatives. Consequently, all alternatives would be consistent with Guideline ALL G1.

Guideline VEG G1: *Vegetation management projects should be planned to recruit a high density of conifers, hardwoods, and shrubs where such habitat is scarce or not available. Priority for treatment should be given to stem-exclusion, closed-canopy structural stage stands to enhance habitat conditions for lynx or their prey (e.g. mesic, monotypic lodgepole stands). Winter snowshoe hare habitat should be near denning habitat.*

The BCRP seeks to reduce the acreage of lodgepole pine stands formed after the 1910 fire, many of which are stem-exclusion, closed-canopy structural stage stands. Regeneration harvest proposed

under alternatives 2 and 3 target a number of stands dominated by lodgepole pine that are expected to recruit a high density of conifer, hardwoods and shrubs. Consequently, the project would be consistent with Guideline VEG G1.

Guideline VEG G4: *Prescribed fire activities should not create permanent travel routes that facilitate snow compaction. Constructing permanent firebreaks on ridges or saddles should be avoided.*

Portions of regenerated units may be bordered with fireline dug by hand crews (approximately 18 inches wide), but firelines are expected to support vegetation within five years of burning. There would be no permanent firebreaks constructed for this project and no permanent travel routes would be established. Consequently, all alternatives would be consistent with Guideline VEG G4.

Guideline VEG G5: *Habitat for alternate prey species, primarily red squirrel, should be provided in each LAU.*

Each of the affected LAUs contain more than 8,000 acres of well-distributed mature or nearly mature (greater than 10 inches dbh) forest within lynx habitat, providing substantial habitat for alternate prey species such as red squirrels. Consequently, all alternatives would be consistent with Guideline VEG G5.

Guideline VEG G10: *Fuel treatment projects within the WUI as defined by HFRA should be designed considering Standards VEG S1, S2, S5 and S6 to promote lynx conservation.*

The project is consistent with VEG S1, VEG S2, VEG S5 and VEG S6 under all alternatives. Consequently, all alternatives would be consistent with Guideline VEG G10.

Guideline VEG G11: *Denning habitat should be distributed in each LAU in the form of pockets of large amounts of large woody debris, either down logs or root wads, or large piles of small wind thrown trees ("jack-strawed" piles). If denning habitat appears to be lacking in the LAU, then projects should be designed to retain some coarse woody debris, piles, or residual trees to provide denning habitat in the future.*

Potential denning habitat in the form of mature forest currently comprises about 24 percent of the Boulder and Katka LAUs, and about 19 percent of the Grouse LAU. Since denning habitat can be found in a variety of forest structures and in small areas, denning habitat is not likely to be lacking in the affected LAUs. Consequently, all alternatives would be consistent with Guideline VEG G11.

Guideline LINK G1: *NFS lands should be retained in public ownership.*

The project does not involve transfer of ownership of NFS lands and therefore would be consistent with Guideline LINK G1.

Guideline HU G3: *Recreation developments and operations should be planned in ways that both provide for lynx movement and maintain the effectiveness of lynx habitat.*

All recreation enhancements proposed in the BCRP would not increase the footprint over the existing use. Therefore, lynx movement and effectiveness of lynx habitat would not be considerably affected. All alternatives would be consistent with Guideline HU G3.

Guideline HU G7: *New permanent roads should not be built on ridge-tops and saddles, or in areas identified as important for lynx habitat connectivity. New permanent roads and trails should be situated away from forest stringers.*

No new permanent roads or trails are proposed under any of the alternatives. Consequently, all alternatives would be consistent with Guideline HU G7.

Guideline HU G8: *Cutting brush along low-speed, low-traffic-volume roads should be done to the minimum level necessary to provide for public safety.*

Cutting brush along designated haul routes would be done to the Forest Service standard, then allowed to revegetate naturally on roads to be placed into long-term storage. All alternatives would be consistent with Guideline HU G8.

Guideline HU G9: *On new roads built for projects, public motorized use should be restricted. Effective closures should be provided in road designs. When the project is over, these roads should be reclaimed or decommissioned, if not needed for other management objectives.*

Temporary roads built for project activities would remain unavailable for public use during implementation, and would be obliterated following project activities. All alternatives would be consistent with Guideline HU G9.

Guideline HU G11: *Designated over-the-snow routes or designated play areas should not expand outside baseline areas of consistent snow compaction, unless designation serves to consolidate use and improve lynx habitat. This may be calculated on an LAU basis, or on a combination of immediately adjacent LAUs.*

The BCRP proposal would not change currently designated over-the-snow routes or designated play areas. Consequently, all alternatives would be consistent with Guideline HU G11.

Since the project does not involve livestock management, guidelines pertaining to this issue (Guidelines GRAZ G1-G4, LINK G2) do not apply to this project. In addition, this project does not involve ski areas, winter recreation areas, mineral and energy development, or upgrading unpaved roads to maintenance levels 4 or 5, so Guidelines HU G1-G2, G4-G6, G10, and G12 do not apply. Consequently, all alternatives would be consistent with these Guidelines.

Grizzly Bear

The Boulder Creek Restoration Project alternatives 2 and 3 would authorize long-term road storage and decommissioning to increase core habitat and decrease TMRD in the Boulder BMU to meet Forest Plan motorized access standards. OMRD would increase during each of the three separate harvest "phases" of the project, but would not exceed the Forest Plan standard of 33% during any phase. The BCRP may result in short-term (during implementation) disturbance to grizzly bears, but would achieve long-term (after 8-10 years) improvements to grizzly bear habitat in the BMU. Potential disturbance and displacement of individual bears from project activities, along with the current (substandard) condition of the Boulder BMU, would produce effects that are not completely insignificant or discountable.

Habitat Relationships

Populations of grizzly bears persist in those areas where large expanses of relatively secure habitat exist and where human-caused mortality is low. Grizzly bears are considered habitat generalists, using a broad spectrum of habitats. Use patterns are usually dictated by food distribution and availability combined with a secure environment. Grizzlies commonly choose riparian areas and wet meadows during the spring and generally are found at higher elevation meadows, ridges, and open brush fields during the summer (Volsen 1994).

Grizzly bears are opportunistic feeders and will prey or scavenge on almost any available food. Plants with high crude protein content and animal matter are important food items. The search for food has a prime influence on grizzly bear movements. Upon emergence from the den grizzlies move to lower

elevations, drainage bottoms, avalanche chutes, and ungulate winter ranges where their food requirements can be met. Throughout spring and early summer grizzlies follow plant phenology back to higher elevations. In late summer and fall, there is a transition to fruit and nut sources, as well as herbaceous materials. This is a general pattern, however; bears will go where they can meet their food requirements (USDI Fish and Wildlife Service 1993).

Grizzly bear habitat across the region is best described in terms of the availability of large tracts of relatively undisturbed land that provide some level of security from human depredation and competitive use of habitat by humans (including roading, logging, grazing and recreation) (USDI Fish and Wildlife Service 1993). The Grizzly Bear Recovery Plan (USDI Fish and Wildlife Service 1993) indicates that the most important element in grizzly bear recovery is securing adequate effective habitat. This is a reflection of an area's ability to support grizzly bears based on the quality of the habitat and the type and amount of human disturbance imposed on the area. Controlling and directing motorized access is one of the most important tools in achieving habitat effectiveness and managing grizzly bear recovery (USDI Fish and Wildlife Service 1993).

Affected Environment

The historic range of the grizzly bear once included most of the continental United States west from the Great Plains, but widespread reductions in range and population numbers led to the grizzly bear being listed as threatened under the ESA in 1975. Today, it is confined to less than two percent of its former range and is represented in five or six population centers south of Canada, including the Cabinet-Yaak and Selkirk Ecosystems that are located in northeastern Washington, northern Idaho and northwestern Montana. Habitat loss and direct and indirect human-caused mortality are related to its decline (USDI Fish and Wildlife Service 1993).

The Boulder Creek Restoration Project area is located in Boulder BMU of the Cabinet-Yaak Recovery Zone (CYRZ). The BMU is approximately 62,369 acres (about 97 square miles) in size and is made up of approximately 96 percent federal land (93.6% National Forest and 2.4% Bureau of Land Management (BLM)) with the remainder mostly in small, private parcels. Nearly all of the BLM land is in a single, large parcel in the northern end of the BMU ("Two-Tail Peak"), while private lands are concentrated along the northwestern portion of the BMU ("Paradise Valley" area) with the exception of four small (approximately 20-acre) patented mining claims. The Boulder BMU represents the northwestern extension of the Cabinet Mountains portion of the CYRZ: to the northwest are highly developed private lands in the Kootenai River valley southeast of the city of Bonners Ferry (Paradise Valley), to the southwest is a portion of the Grouse BMU characterized by mixed ownership consisting of State of Idaho and private industrial lands managed for timber production, and to the northeast the BMU is bordered by a steep-sided canyon formed by the Kootenai River with a broad, mostly developed bench ("Curley Creek/Herman Lake" area) on the opposite side (see figure 1).

Much of the Boulder BMU is currently unroaded – in fact there are portions of two inventoried roadless areas (IRAs) within the BMU (Katka Peak and Mt. Willard-Lake Estelle IRAs). Although there is an extensive road network outside the IRAs, opportunities to reduce road densities (and increase core) are somewhat limited in the BMU due to: 1) the high density of roads on private lands in the northwestern part of the BMU, 2) a major rail line running the length of the northeastern portion of the BMU, 3) the presence of small private parcels (patented mining claims), and 4) an active mining claim near Boulder Meadows in the southwest portion of the BMU[1]. Additionally, the two IRAs are separated by an open road (FSR 408) that runs east/west nearly the entire width of the BMU. This particular road was the

[1] Lands referred to in items 3 and 4 likely would require some form of continued motorized access under existing laws.

center of much controversy in the mid-1990s when it was proposed for closure under the Katka Peak EIS. Ultimately, an agreement was reached between the BFRD and affected stakeholders to allow the road to remain open, but be maintained in a "primitive" (unimproved) state. While the District is not legally precluded from proposing this road for closure again at some point in the future, it would not come without considerable social and political cost.

The Boulder BMU was delineated to include all seasonal habitats for grizzly bears. At least one collared grizzly bear (an augmented female) has been documented denning near Katka Peak, and there is abundant denning habitat along this ridge and others to the south. Much of the south-facing slopes north of Boulder Creek, the Two-Tail area, and low-elevation areas on or adjacent to private lands along the northwest portion of the BMU provide ungulate winter range and early green-up of grasses and forbs in spring. However, spring range in the form of expanses of wet meadows is limited in the BMU to the "Boulder Meadows" area along upper Boulder Creek. There are also numerous avalanche chutes at higher elevations along the Clifty/Katka Peak ridgeline in the northern portion of the BMU and the higher elevation ridgelines that form the southwestern and southern boundaries of the BMU. Low- and mid-elevation mesic vegetation (late-spring and early-summer habitats) is available along Boulder Creek and a number of tributaries (particularly East Fork Boulder Creek – the largest tributary). There are a number of smaller natural openings at higher elevations, as well as extensive seral brushfields at the headwaters of Boulder Creek and large tributaries, that provide high concentrations of huckleberries in late summer and fall. However, there has been little timber harvest at higher elevations over the last 15 years in the BMU, and no major stand-replacing fire since the 1926 event. As a result, manmade openings and seral brushfields are becoming less productive with respect to huckleberry availability, and available forage may currently be declining in the BMU.

Confirmed sightings of grizzly bears have been sporadic in the Boulder BMU between the late-1970s and present, the most recent being a female with young near Two-Tail Peak in fall, 2003; an augmented radio-collared female denning near Katka Peak in 2007; and documentation of a track near Boulder Meadows in September 2011.

The CYRZ was most recently estimated to contain at least 42 grizzly bears (Kasworm et al. 2010). The Yaak River portion of the CYRZ to the north contains a higher density of bears than the Cabinet Mountains portion, with an estimated twice as many bears contained in approximately one-third of the recovery zone. The reasons for this difference may have more to do with proximity of the Yaak River bears to grizzly populations in the Canadian Purcells than with habitat quality or mortality patterns (Proctor et al. 2012).

Beginning in 1994, the Interagency Grizzly Bear Committee (IGBC) issued direction calling for establishing BMU-specific levels for secure "core" habitat (more than 500 meters from a drivable road or motorized trail), Open Motorized Route Density (OMRD - includes open roads as well as motorized trails and railroads) greater than one mile per square mile, and Total Motorized Route Density (TMRD - includes open and restricted roads as well as motorized trails and railroads) greater than two miles per square mile (IGBC 1998). Research levels of these three parameters reported by Wakkinen and Kasworm (1997) for the CYRZ and Selkirk Recovery Zone (SRZ) became the basis for management standards defined by the Forest Plan Amendments for Motorized Access Management within the Selkirk and Cabinet-Yaak Grizzly Bear Recovery Zones ("Access Amendment") (USDA Forest Service 2011a) and associated Biological Opinion (USDI Fish and Wildlife Service 2011a).

The Access Amendment also set "administrative use" (passenger vehicle access on restricted roads by personnel of resource management agencies, contractors and permittees to conduct non-mechanized activities or otherwise as previously consulted on) levels, and timelines for full implementation of the management standards. Administrative use in the CYRZ is limited to a total of 60 motorized round trips

during the active grizzly bear season (April 1 – November 30) apportioned as follows: 18 trips in "spring" (April 1 – June 14), 23 in "summer" (June 15 – September 14) and 19 in "fall" (September 15 – November 30). Exceeding trip limits during any season requires modeling affected road segments as "open" for OMRD calculation purposes. The BCRP area contains a number of restricted road systems within the BMU.

Forest Plan Standards for access management in the Boulder BMU are: 1) less than or equal to 33 percent of the BMU having OMRD greater than one mile per square mile, 2) less than or equal to 29 percent of the BMU having a TMRD greater than two miles per square mile, and 3) greater than or equal to 55 percent of the BMU in core habitat. The TMRD research result of 26 percent from Wakkinen and Kasworm (1997) would be difficult to achieve in this BMU due to the presence of highly roaded private lands along the northwestern boundary and a rail line closely paralleling an open arterial road nearly the entire length of the northeastern boundary, so the Boulder BMU TMRD Standard has been set at 29 percent. However, to achieve 55 percent core habitat, it is highly unlikely that TMRD would greatly exceed 27 percent given the spatial arrangement of roads in the BMU.

The 2016 condition of the Boulder BMU is 52[2] (51.6) percent core, 29 (29.2) percent OMRD, and 31 (31.4) percent TMRD. OMRD is somewhat variable from year to year (depending upon the nature and location of ongoing activities), and is managed at or below the 33 percent threshold through more than a dozen gates within the BMU. Currently, the IPNF is nearing completion of the Leonia Restoration Project, which will further reduce road densities in the BMU. Once fully implemented, this project will increase core by an additional 0.5 percent (to 52.1%), and reduce TMRD by another 0.7 percent (to 30.1%).

Grizzly bears were absent from or at very low densities in the Cabinet Mountains at the time of Federal listing in 1975 (USDI Fish and Wildlife Service 1993) and remain low. Thus, it is unknown to what extent past timber harvest impacted grizzly bears in the short term (during implementation) since it is likely that persistent grizzly bear use of the area is a relatively recent (20 to 25 years) occurrence. The longer term (post implementation) effect of regeneration harvests is a temporary reduction of forest cover and increase of foraging habitat. Road construction associated with past harvests that provides public forest access has reduced habitat security and increased the potential for grizzly bear-human interactions.

Environmental Consequences – *Grizzly Bear*

Methodology

The analysis of effects on grizzly bears focuses on changes to core habitat and motorized route densities in the Boulder BMU during the active grizzly bear season (April 1 – November 30). Motorized route density analysis used ARC/Info software to process a GIS layer depicting transportation features (roads) updated to reflect current conditions. Road densities were determined from a "moving window" protocol, where motorized routes were buffered to create density contour maps based on a defined pixel (cell) size. Miles of road were then calculated within a set window distance (one square mile) around each pixel as the percent area within the BMU where road density exceeds a certain threshold (described in Wakkinen and Kasworm 1997). Core habitat is calculated by buffering all motorized routes by 500 meters within the GIS layer, then subtracting buffers from the BMU total area.

[2] BMU conditions (Core, OMRD and TMRD) are annually reported rounded to the nearest one percent. However, whole number values can often mask the effects of project-level activities (for example, 0.5% – the potential rounding error – of this BMU would be approximately 312 acres), so results are reported here rounded to the nearest 0.1% - although they will continue to be displayed in annual reports as whole percentages.

Since the IPNF has not adopted a vegetation-based grizzly bear habitat model, possible changes to vegetation with the potential to influence grizzly bear habitat are addressed qualitatively. Potential disturbance of grizzly bears due to human activities is another effect that is difficult to quantify, so is accounted for by assessing impacts to core and motorized route densities, or is addressed in general terms where appropriate.

Alternative 1 - Direct, Indirect and Cumulative Effects

Alternative 1 would not have any direct or indirect effects and so would not contribute to any cumulative effects. With no action, motorized access and vegetative habitat conditions would remain unchanged and there would be no additional disturbance to grizzly bears above what currently exists. Although there would be no temporary displacement of grizzly bears from project activities, some timber stands in the BMU would continue to deteriorate as mortality from insects and disease increases. Hiding cover would remain in greater quantities than under the action alternatives, but cover is generally not limiting in this part of the CYRZ. Although forage (huckleberries) is currently available in some of these stands, this production may be more sustainable over time if lodgepole pine were replaced by longer-lived seral species. Other forage species (grasses and forbs) would also become more abundant after the regeneration harvest or burning described in the action alternatives.

Continued fire suppression would help retain forest cover, further contributing to reduction of foraging habitat. Fire suppression also has the possibility of causing disturbance to grizzly bears from increased foot, vehicle, and sometimes aircraft use during suppression activities. The amount of future fire and level of successful suppression is impossible to predict, but would generally result in the effects described.

Direct and Indirect Effects Common to Alternatives 2 and 3

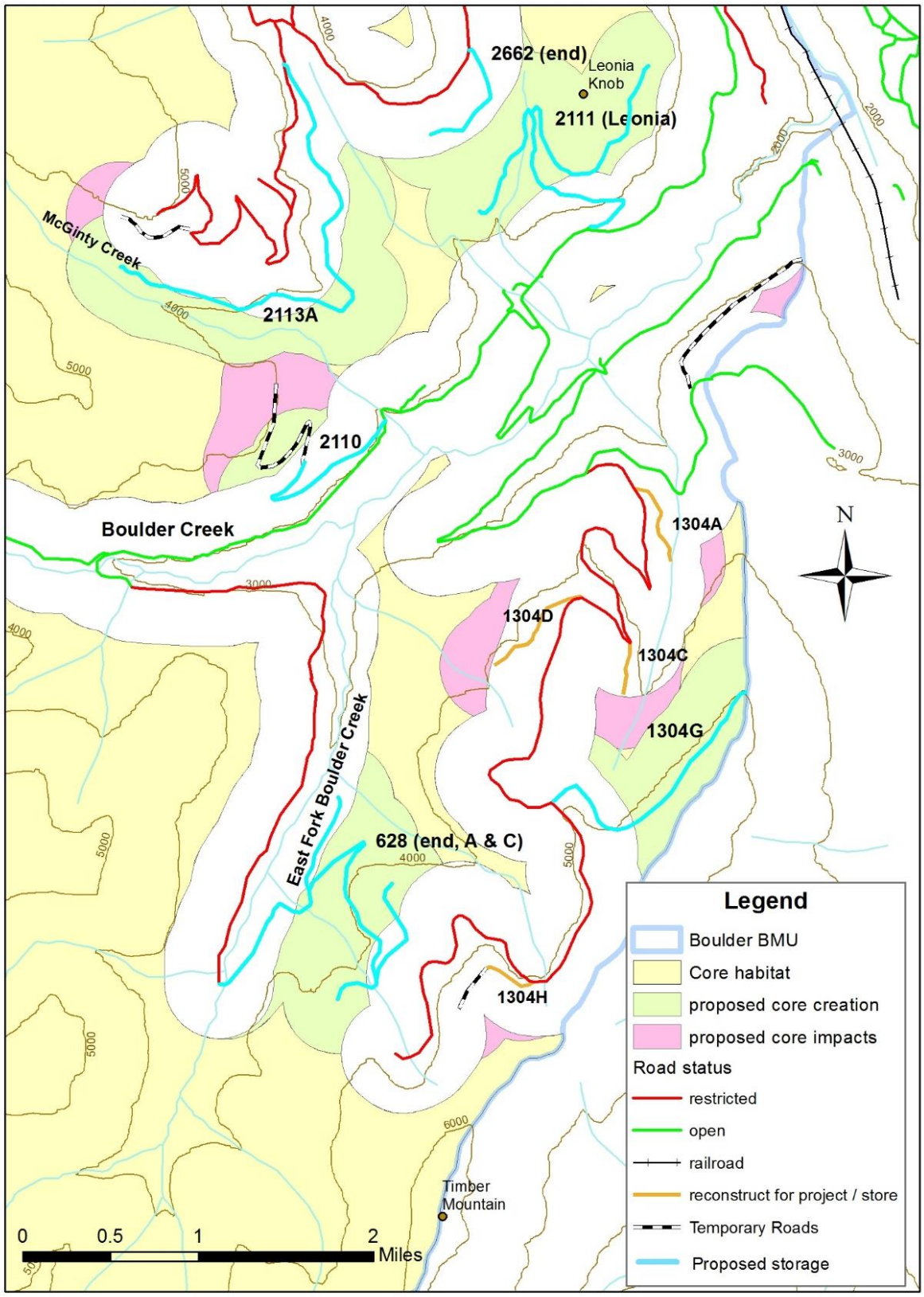
Motorized Access Management

Core Habitat and TMRD

The IPNF analyzed the transportation system for the Boulder BMU through the "TAPS" process beginning in 2014. Several combinations of road closures were assessed and rated based on relative value of adjacent acres to grizzly bears, cost, current road conditions, public access, and miscellaneous factors. After weighing pertinent issues, the interdisplinary team recommended storage of the following road segments: uppermost approximately 2.5 miles of FSR 628 (East Fork Boulder) including 628A (0.6 mile) and 628C (0.8 mile); FSR 2110 (1.0 mile currently behind a guardrail barrier, although it had been modeled as a restricted road segment for annual grizzly bear reporting); FSR 2113A (3.0 miles); FSR 1304G (1.6 miles) and 1304H (0.4 mile); the terminal 0.9 mile of FSR 2662; and the last 1.0 mile of FSR 1304 (currently impassible) (figure 3).

All of these roads are currently restricted through the active grizzly bear season (April 1 – November 30), and none provide primary access to campgrounds, trailheads, or other recreation facilities. From a habitat standpoint, storage of the upper 628, 2113A and 2662 end would connect smaller, isolated core blocks with larger core areas. The core block north of 1304G also connects to a large core block through the adjacent Kootenai National Forest (KNF). FSR 2113A, while in good condition, has served as a conduit for illegal ATV use of the restricted FSR 2662 system (nearly 15 miles of restricted roads) via trail 182. Also, the upper 628, 2113A and 2662 form stacked road systems with other roads that would remain and continue to provide access to these areas for fire and other resources. It was determined that this combination offered the best balance of grizzly bear security and continued access for management and public use.

Figure 3. Proposed road changes in the Boulder BMU



Roads that are placed into long-term (e.g., a minimum of 10 years) storage are no longer counted toward road densities for purposes of grizzly bear habitat assessment per direction from the Interagency Grizzly Bear Committee (IGBC 1986, 1998) and U.S. Fish and Wildlife Service (USDI Fish and Wildlife Service 2011b). Storage is designed to render these road segments undrivable, but also hydrologically inert, by installing waterbars along the full length of affected roads, removing drainage structures (culverts), and fully recontouring specific sections. While these roads would not be accessible during the "stored" period, they would remain on the system if needed for emergency[3] purposes.

Once the BCRP is fully implemented, 55 (55.0) percent of the BMU would be in core habitat, and TMRD would be reduced to 25 percent (24.7%). Less than 600 acres of the resulting core habitat would be in small (less than 2 square miles) blocks, while the remainder (54 percent of the BMU) would be in blocks of 20 square miles or larger. The core gained through project activities would be a combination of lower-elevation, dry, south facing slopes that likely have greatest value to bears during the spring season (from FSR 2113A, 2110 and 2662) and mid- or high-elevation mesic sites that likely provide more bear forage items in late-summer and fall (FSR 628 and 1304G).

Proposed timber harvest would require use of three groups of restricted roads in the lower Boulder Creek drainage: FSR 1304 (North Creek), FSR 628 and FSR 2110 (East Fork Boulder), and FSR 2662 (Caboose Creek) including FSR 2113 and 2113A. To reduce potential effects to grizzly bears, provide undisturbed displacement habitat, and maintain OMRD at or below the Forest Plan standard, implementation would be distributed in "phases" (by group). Timber hauling and major road work (reconstruction and large culvert replacement) on restricted roads would be conducted as follows: Phase 1 - FSR 1304 and associated spurs, Phase 2 - FSR 628 & associated spurs plus FSR 2110 and temp roads associated with this road, and Phase 3 - FSR 2662 (2113 and 2113A). No two of these phases may be active during the same bear year (4/1 – 11/30) (see Design Criteria). Additionally, timber harvest of unit 50 (along restricted FSR 2260) would not take place during the same year that phase 3 is active. Helicopter harvest using landings accessed by FSR 2113A would not be active during phases 1 or 2. This feature would avoid simultaneous disturbance across multiple subwatersheds, and maintain OMRD at 33 percent or less during project implementation (see OMRD discussion, below).

Project implementation would require reconstruction and use of several currently stored road segments as well as temporary road construction. Most of these road segments would result in temporary core loss and potential displacement of grizzly bears. Specifically, the project proposes reconstruction of FSR 1304A, 1304C, 1304D, and 2110; and temporary road construction at four different locations. Although FSR 2110 is currently considered to be stored in the IPNF database, it has been modeled as restricted for a number of years in the reported BMU condition (and has a drivable road surface). As a result, reopening this portion of road would not affect core habitat condition. Also, temporary road construction and use emanating from FSR 2113 would take place during the denning season, so would not affect core. The length of road construction/reconstruction, and amount of core affected by each, are displayed in table 7.

To reduce potential effects to grizzly bears, replacement core habitat would be provided prior to (or concurrent with) the core impacts discussed above. Storage of FSR 1304G would take place prior to or concurrent with reconstruction and use of currently undrivable road segments and temp roads emanating from FSR 1304 (1304A, 1304C, and 1304D) and FSR 2110. Storage of FSR 2111 (Leonia Project) and 0.8 mile of FSR 2662 would take place prior to or concurrent with reconstruction and use of currently undrivable road segments and temp roads emanating from FSR 2110 (see Design Criteria). Storage of FSR 1304G would result in creation of approximately 336 acres of core habitat – offsetting the approximately 200 acres of core temporarily lost through reconstruction of FSR 1304 spur roads and 99

[3] "Emergencies" as defined by Endangered Species Act regulations [50 CFR 402.05] and associated policy and handbook direction.

acres lost through temporary road construction along FSR 403 and 314. Storage of FSR 2111 in combination with a portion of FSR 2662 would result in approximately 622 acres of core gain, which would offset approximately 177 acres temporarily lost to road construction on FSR 2110. At no time would core decrease from the current (51.6%) level, and core would steadily increase as various timber harvest phases are completed, unneeded roads are stored, and temporary roads closed.

Table 7. Length (miles) and effect to core (acres) from road construction and reconstruction in the Boulder Creek Restoration Project

Road segment	Length (miles)	Core impact (acres)
1304A	0.5	16
1304C	0.3	74
1304D	0.7	110
2110	1.1	0[1]
2110 temp	1.2	177
403 temp	0.5	77
Boulder City (314) temp	1.1	22
2113 temp	0.5	0[2]

[1]FSR 2110 is currently modeled as "restricted", so use of this road would not impact core habitat.

[2]this temporary road segment would be constructed and used during the denning (winter) season only.

OMRD

The current (2016) Open Motorized Route Density greater than 1 mile/mile^2 (OMRD) in the Boulder BMU is 29 (29.2) percent. The represents a state where no restricted roads[4] are opened to public use or have administrative use limits exceeded (i.e., the lowest achievable OMRD with the current configuration of roads in the BMU). Use of restricted roads, reconstructed (previously stored) segments, and temporary roads all would contribute to increased OMRD in the BMU during implementation. Once post-harvest fuels treatments are complete, OMRD would be returned to pre-project levels through obliteration of the temporary roads, returning previously stored segments to a stored condition, and reapplication of seasonal motorized use restrictions.

Due to the lengths of restricted roads needed for timber harvest and their effect on OMRD, timber harvest using these roads would occur in three phases (see discussion above). Phase 1 (FSR 1304 system), Phase 2 (FSR 628 and 2110), and Phase 3 (2113 and 2113A) would each individually raise OMRD to 33 percent (32.7%, 32.7% and 33.4%, respectively) while active. Since any overlap or combination of phases would cause OMRD to exceed 33 (rounded) percent, timber harvest (or other activities that exceed administrative use limits) in each phase would be conducted independently of the others.

Although project activities would raise OMRD for up to six years during project implementation (2 years

[4] Road 427UH is a gated road leading to an active mining claim. Although this road is suspected to recieve very little motorized use, it is modeled as "open" due to unknown amounts of use and uncertainty regarding future use levels.

for each phase), restricted roads, reconstructed road segments, and the temporary roads would only be "open" in the sense that administrative use limits are exceeded (and not open for public use). Consequently, any expected take from the project would be in the form of displacement, rather than direct mortality that can potentially be associated with roads that are open to the public. Additionally, there is ample adjacent displacement habitat available in the form of the large unroaded (core) areas and other areas where road restrictions would remain in force.

All timber harvest, road reconstruction, road storage, grapple piling and slashing activities proposed in the BMU would take place outside of the grizzly bear spring season (April 1 – June 15), which is considered to be the most sensitive time period for grizzly bears (particularly sows with cubs of the year). Additionally, the proposed temporary road off FSR 2113 would be constructed and used only during the denning (winter) season to reduce potential impacts to grizzly bears (see "Design Features" section).

River Walk Trail Access (FSR 2209)

Opening approximately 2.1 miles of FSR 2209 to provide improved access to the Kootenai River Walk (trail 184) would have no effect on core or TMRD, since this is currently a drivable road segment. Additionally, opening this segment to public use would not increase OMRD[5] due to its location between open FSR 314 and a railroad line. However, while reported OMRD would not be affected by this change, it could still have minor effects on grizzly bears by increasing vehicular traffic (and likely human use off the road) in the vicinity of the River Walk despite no (paper) changes to route densities.

The affected area (along FSR 2209 and the River Walk itself), while generally northeast-facing, consists of low elevation (below 2,500 feet) areas where temperatures are moderated by proximity to the Kootenai River. As a result, much of the area takes on the character of warmer, drier aspects where most vegetation becomes green, and subsequently senescent (dried out), relatively early in the season. Therefore, any grizzly bear use of this area likely occurs in the spring season when green-up and carrion from winter-killed ungulates provide available food sources. For this reason, FSR 2209 would remain restricted during the spring season (April 1 – June 15) to reduce human disturbance and the risk of mortality during spring black bear hunting seasons.

Vegetation Management

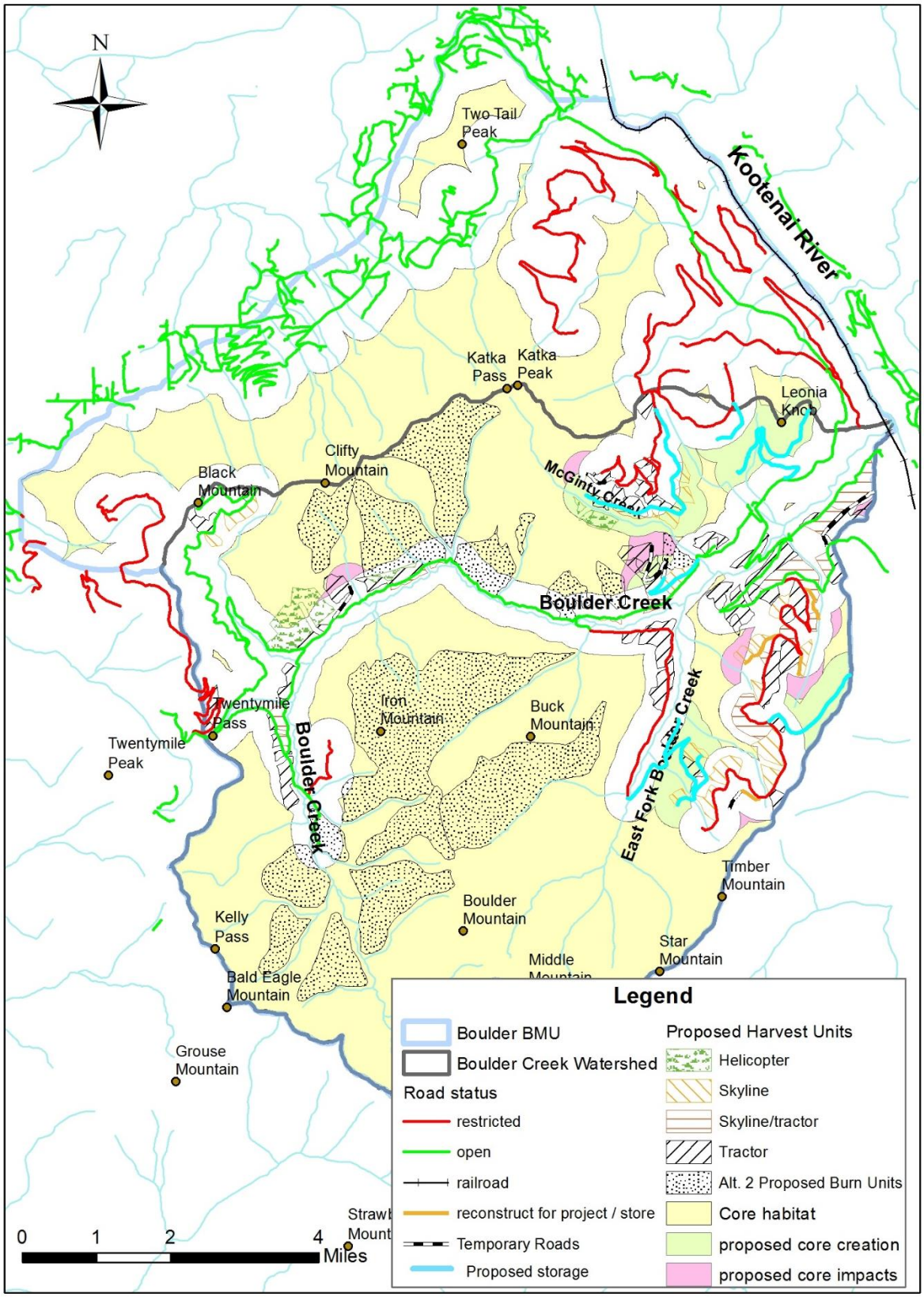
Timber Harvest

The project proposes approximately 3,433 acres of timber harvest in the Boulder BMU, including about 3,088 acres of ground-based (tractor and skyline) yarding and 345 acres of helicopter yarding. Harvest activities would be expected to create a disturbance to grizzly bears if they were present in the area when they take place. The reaction of individual bears to this disturbance will vary: while some may completely avoid the area for the duration of activities, others may still frequent the vicinity of harvest units except when humans and machines are actually present. Harvest activities would be confined to harvest units and daylight hours, and would not last for more than a few weeks in any individual unit.

Harvest activities accessed by restricted road systems have been subdivided into three "phases" – no two of which can be active at the same time (see "Design Features", and "Motorized Access Management" section, above). This feature would effectively limit harvest disturbance by geographic area in places where human presence is normally uncommon (along restricted roads).

[5] Changing this road segment from "restricted" to "open" moves more than 800 acres from the ">1-2 miles/mile^2" density category to the ">2 miles/mile^2" density category. However, since OMRD is reported as a percentage of the BMU with an open route density of >1 mile/mile^2, the reported OMRD does not change (these two categories are combined for reporting purposes).

Figure 4. Proposed Boulder Creek Restoration Project harvest and burn-only units in relation to core habitat in the Boulder BMU



About half of the proposed harvest (approximately 1,771 acres) would fall under this restriction: approximately 801 acres in phase 1, 561 acres in phase 2, and 409 acres in phase 3. The remaining approximately 1,662 acres of harvest are concentrated near the western or eastern edges of the central portion of the Boulder BMU. Only a small portion (about 128 acres) of these units would impact core habitat (see below). Remaining harvest areas are within the zone of influence of what are normally well-traveled, open road segments. Although widely dispersed in the BMU, these units would impact areas where bears are less likely to be present.

Because the sale was designed to utilize the existing road system, nearly all proposed units are adjacent to a drivable road. Because of this, timber harvest in what is currently core habitat would be limited to about 245 of the proposed harvest acres. Additionally, the zone of influence of temp roads and reconstructed (currently undrivable) roads would reduce the amount of core impacted by subsequent harvest to approximately 128 acres: about 112 acres of helicopter unit 38 and 14 acres of tractor unit 66. As a result, potential disturbance to grizzly bears in core habitat from harvest activities would be moderated by the fact that road construction is expected to have already displaced bears from most of these areas immediately prior to harvest (figure 4).

Most (about 1,862 acres) of the proposed harvest acres would be yarded by tractor, with smaller amounts by skyline cable system (631 acres), a mixture of tractor and skyline (595 acres), or helicopter (345 acres). All three systems have the potential to disturb bears while yarding takes place. Of the ground-based systems, tractor yarding is generally louder and more disruptive while ongoing, but it also progresses at a much faster rate, so more acres can be harvested in less time where volumes are similar. Skyline yarding places equipment only on the uppermost portions of the harvest unit (usually on a road), with hand-operated chainsaws being the only mechanized presence throughout most of the unit. However, this system would generate disturbance over a longer time period than tractor yarding.

Helicopter yarding has the potential to disturb grizzly bears more than ground-based systems, since the source of disturbance is louder, farther off the ground (allowing the sound to carry farther), and not confined to the unit itself[6]. If landings are relatively close, this form of yarding could progress at roughly the same rate as a skyline cabling system with comparable volumes and tree sizes. General helicopter effects to grizzly bears are discussed in detail in the "Alternative 2" section, below.

Approximately 2,999 acres of the proposed timber harvest would be a seedtree or shelterwood prescription. While all three harvest prescriptions (seedtree, shelterwood and group selection) are considered regeneration harvest, group selection is an uneven-aged regeneration prescription where only a portion (groups) of the overall unit is harvested in the initial entry[7]. As a result, group selection harvest units would retain considerably more cover after harvest, since large portions of the units would be unharvested. These units are expected to retain adequate hiding cover for grizzly bears, while seedtree and shelterwood units would not. Despite temporary reductions in regeneration units, hiding cover (sapling-sized or larger timber) would remain on almost 64[8] percent of the BMU immediately following project activities. Within about 10 years post-treatment, growth of shrubs and regenerating conifers is expected to provide hiding cover in regeneration units once again.

Regeneration harvest is expected to result in increased grizzly bear forage from both plant (increased abundance of palatable plants from more sunlight reaching the forest floor) and animal (higher numbers of animals that can be preyed upon or scavenged due to improvements in ungulate forage quantity and quality) sources. High-quality forage plants (mainly huckleberries) are present in various quantities in

[6] Harvested material is flown to a nearby landing accessible by truck, usually less than one mile from the unit.
[7] Usually group selection prescriptions call for multiple entries, but this is rarely practiced on the IPNF.
[8] This figure assumes no hiding cover would remain in proposed burn-only units, which is highly unlikely.

some of the stands proposed for treatment, although at low densities or almost completely lacking in some of the lodgepole pine stands with sparse understories. Timber harvest and subsequent fuels treatments may temporarily inhibit berry production in treated stands where they currently exist, but would likely result in increased berry production within 10 to 15 years after treatment. The Fish and Wildlife Service states that most preferred grizzly bear vegetative food items occur in early seral communities with low forest cover (USDI Fish and Wildlife Service 2011), and Kasworm et al. (2010) report that one of the habitat components Cabinet-Yaak grizzly bears made greatest use of was "mixed shrub/cutting units" (defined as "open sites which have been harvested and are currently dominated by shrubs").

Post-harvest fuels treatments include approximately 91 acres of grapple piling, 1,423 acres of underburning, and approximately 1,919 acres of a mixture of grapple piling and underburning. As discussed above, virtually all of the ground-based harvest acres are along open or restricted road segments. Piling and burning would be planned so that administrative use limits (driving in/out to access units) would not be exceeded on restricted roads, so would not increase OMRD.

The equipment used for actual piling (usually a small excavator) represents a source of mechanized disturbance off of, but in close proximity to, roads. Grapple piling could potentially be a source of disturbance to bears, if they were present when these activities take place. However, piling usually takes place during the first summer/fall following harvest (so high fuel loads are not present for extended periods) – so grizzly bears are not expected to make extensive use of these areas during this activity because the area recently (during the previous 1-2 active bear seasons) had been subject to a high level of human activity associated with logging, and because recent ground disturbance from timber harvest, and logging slash on the ground, limit the amount of forage plants available to bears this first year.

Underburning is the only project-related activity that would be allowed during the spring season (although fall burning would be used to the extent practicable), and generally[9] would not involve mechanized use except for passenger vehicles driving restricted roads to provide access for burning crews. Underburning would take place over a number of days and could span several years (depending upon harvest schedules). Although underburning could take place over a more prolonged time frame than grapple piling, actual burning would be a relatively ephemeral event (1-2 days at a time when conditions warrant) compared to more continuous disturbance piling would create.

Burning

Approximately 172 acres of burning only (burn unit 4 and a portion of unit 12) are common to both action alternatives. Use of fire as a restorative tool (either wildfire or prescribed burning) is generally considered to be beneficial for grizzly bears. Fire increases ecosystem diversity and creates a greater variety of forage items over time. Grizzly bears feed on the lush revegetation of grasses and forbs that occurs relatively quickly after fire, and also on ants and other invertebrates that inhabit the dead trees that have fallen to the ground. Since bears are highly mobile and opportunistic, they are able to avoid the harmful aspects of fire (such as injury from flames or falling trees during actual burning) yet make full use of the resulting diversity of burned and unburned habitats for foraging and cover (USDI Fish and Wildlife Service 2003). The potential effects of prescribed burning are discussed in detail in the "Alternative 2" section, below.

Other activities

Precommercial thinning is proposed on approximately 806 acres within the Boulder BMU. Approximately 274 acres would be accessed by restricted FSR 628, approximately 244 acres would be accessed by restricted FSR 2113 and 2113A (FSR 2662 system), and the remaining 288 acres are along

[9] Underburning of some or all of the approximately 345 acres of helicopter harvest may use aerial ignition from helicopter. General helicopter effects to grizzly bears are discussed in detail in the "Alternative 2" section.

open roads. Approximately 70 acres (portions of four different units) of proposed units are in core habitat.

All precommercial thinning would be conducted by hand crews using chainsaws. All units are adjacent to, or in close proximity to, drivable roads. Like other forms of mechanical activity, chainsaw use has the potential to disturb grizzly bears that may be present when the activity takes place. However, unlike vehicular use, this disturbance would be confined to one location, and bears need only move away from the source of noise or visual disturbance to regain a sense of security. Treated areas would be subject to disturbance of relatively short duration, and would generally have ample displacement habitat available for bears to utilize. Thinning would be accomplished within administrative use limits, so would not increase OMRD. No thinning activities would take place during the spring season.

Vegetative changes to grizzly bear habitat from this activity would be minor. These stands currently contain high densities of young conifers, so they do not likely provide preferred forage plants since there would be little growing space or sunlight available near the ground. Although cover would be considerably reduced by this activity, precommercially thinned stands would still contain several hundred 20-foot or taller trees per acre, and loss of cover would not be sufficient to increase sight distance (a distance at which 90 percent of a bear is hidden from view) to 100 feet or more in affected units.

Creation of a 22-acre fuel break adjacent to the Black Mountain Lookout relocation site would involve slashing small trees (generally less than 5 inches in diameter) and cutting tall brush. Surface fuels would be grapple piled or hand piled (depending on slope limitations to machinery) and then the piles would be burned. The potential disturbance effects of this activity would be similar to that of precommercial thinning, but of shorter duration because fewer trees would require slashing. The resulting stand would resemble a precommercially thinned unit in structure, but residual trees would generally be of a larger size (pole-sized).

Spraying herbicides to control and prevent noxious weeds would take place along roads and turnouts before and after harvest activities under all action alternatives. Road segments identified for weed treatment and proposed for decommissioning or storage would be treated prior to closure (including temporary roads). Treatment along open roads is unlikely to displace grizzly bears since an existing source of disturbance is already present. Noxious weed treatments on restricted roads will be accomplished in one administrative round-trip per year per road, and would also be a minor source of disturbance. Although small amounts of palatable plant species (such as huckleberry bushes) may inadvertently be affected by noxious weed treatments, this activity is not expected to considerably reduce availability of bear forage.

Conversion of FSR 1304G to a trail

The BCRP also proposes to place the full length of currently restricted FSR 1304G (1.6 miles) into long-term storage, and subsequently convert it into a non-motorized trail capable of accommodating mountain bike use. This road originates from seasonally restricted FSR 1304 approximately 4.5 miles behind a gate (at the FSR 314 junction), and terminates at the Timber Mountain Trail (Tr 51) about 2.5 miles above the trailhead on FSR 314 and some 3.7 miles below Timber Mountain itself. This would create a rideable loop of approximately 10 miles using portions of Tr 51, FSR 314, 1304, and 1304G. Tr 51 descends rapidly (more than 1,800 feet) from 1340G down to the trailhead, while 1304G contains barely 200 feet of elevation change its entire length (the elevation is gained via FSR 1304). Tr 51 generally traverses the divide between Boulder Creek and Star and Callahan creeks to the east and south, with scenic views in the higher sections. Above the junction with FSR 1304 (toward Timber Mountain), Tr 51 gets quite steep and rocky, and sees little mountain bike use. Both FSR 1304G and the lower portion of Tr 51 generally pass through dense vegetation, and any scenic vistas on the loop are likely to be from FSR 1304 (looking

back into Boulder Creek). FSR 1304G travels through mature (sometimes old growth) forest, and several 20-25 year old harvest units containing dense conifer saplings. While both forest types likely contain various forage species (forbs, berries, and occasional grasses), there are no dense concentrations of forage items (e.g., snowchutes, extensive huckleberry fields, etc.) along this road.

Storage of FSR 1304G and conversion to a non-motorized trail is expected to have mixed effects on grizzly bears that may utilize this portion of the BMU. Although the potential for motorized access (and associated disturbance and mortality risk from this source) would be removed for a minimum of ten years, the presence and maintenance of a trail would continue to provide a conduit for human disturbance in an area that is proposed to be managed as core habitat – which by definition are areas "free of motorized traffic and high levels of human use" (IGBC 1998).

The Grizzly Bear Recovery Plan (USDI 1993) states that "continued human use of closed roads" can have detrimental effects on grizzly populations based on a learned negative association with roads that may persist for some time after the road has been closed to vehicular traffic, as well as possible conflicts resulting from a level of human presence above what may occur in the absence of a trail. However, the Recovery Plan also notes that bears can make disproportionate use of roads and surrounding habitats due to the ease of travel they provide. Indeed, the IPNF Forest Plan, IGBC direction, and much of the underlying research strongly emphasize the motorized access aspect of road use as being most detrimental to grizzly bear populations because it provides the ability of humans to cover greater distances, and subsequently increases the potential for human/grizzly conflict and direct mortality of bears.

The effects of non-motorized human use on grizzly bears are not well documented. Grizzly bear researchers generally agree that non-motorized human presence in occupied grizzly bear habitat can, at some level, diminish the value of habitat for grizzly bears through modification or displacement (summarized in Claar et al. 1999). Kasworm and Manley (1988) reported that grizzly bears used habitats within 100 meters of trails less than expected, but used habitats 100-1,000 meters from trails in proportion to availability. McLellan and Shackleton (1989) report that bears showed a stronger response to people on foot than in motor vehicles, especially in "low human-use" areas. However, less than half of bears in the study showed any response (walked or ran away) to stimulus greater than 76 meters away. Mace and Waller (1996) also reported that bear response to off-trail hikers was greater than that observed for other types of disturbances.

We were unable to identify any published research that directly evaluates the effects of mountain bike use on grizzly bears. Presumably, mountain bikers are more likely than other non-motorized users to encounter bears (on a per capita basis) because they are quiet, move relatively fast, and cover greater distances. However, despite a recent highly-publicized incident in western Montana, injuries to mountain bikers due to encounters with grizzly bears are almost unheard of. Hikers greatly outnumber mountain bikers on most trails, and serious or fatal hiker/grizzly encounters, while also rare, occur on an almost annual basis. Although individual mountain bikers are likely at greater risk of bear encounters than other non-motorized users, this increase is impossible to quantify from existing research.

In the case of FSR 1304G, it has not been recognizable as a "road" (capable of accommodating motorized vehicle use) for nearly ten years due to encroaching alder, conifer regeneration in the roadbed, and a small slump near its midpoint. Even prior to this, use of this road was sporadic since the late 1990s, as public motorized use was restricted and administrative use was generally limited to a few round trips per year by trail crews to more easily access this portion of Tr 51. The road continues to serve in this capacity (despite no longer being passable to motorized vehicles), as the trail crew now maintains an approximately 3' wide pathway on the existing roadbed. Storage of the road may require removal of existing culverts and construction of waterbars along the road surface, but the general character of the

area would remain unchanged. As a result, it is unlikely that any grizzly bears currently using this area recognize this as a "road" (with associated vehicle use), and the actual change in status would be largely a paper one (little would change on the ground).

Since the proposed trail would begin nearly 4.5 miles up a restricted (gated) road, it has a low probability of being violated by motorized users (compared to trails that can be accessed by an open road). Additionally, the entrance would be partially blocked and signed to discourage illegal use. Presently, the trail appears to receive occasional use by a relatively small group of riders. Given the location, remoteness, and lack of a scenic destination (the trail is ridden as part of a loop with limited views), it is unlikely that it would ever approach high-intensity use as defined by IGBC (1998) and the Interagency Cumulative Effects Model (Interagency 1990). From a grizzly bear standpoint, the road does not traverse any exceptional seasonal habitats that would make it particularly attractive to bears.

The IPNF Forest Plan requires core areas to: 1) contain no motorized travel routes or high use trails, 2) not include any gated or restricted roads, but they may contain roads that are impassable due to re-growth of vegetation, effective barriers other than gates, or placement of logging or forest debris so as to no longer function as a motorized route, and 3) be put in a condition such that a need for motorized access for maintenance is not anticipated for at least 10 years. Based on these parameters, and the relative paucity of research quantifying effects of non-motorized trail use (cycling in particular) on grizzly bears, conversion of FSR 1304G to a non-motorized trail would not preclude the surrounding area from being considered grizzly bear core habitat.

Alternative 2 Direct and Indirect Effects

The only difference between the two action alternatives is that alternative 2 proposes approximately 7,235 more acres of prescribed burning in inventoried roadless areas (7,407 acres compared to 172 acres), including about 100 acres of hand-slashing of submerchantable trees in two of the proposed burn units (units 2 and 3).

Proposed burn units generally are within the area that was heavily impacted by wildfire in 1910. Nearly half of the proposed burning would occur in open shrubfields with occasional conifer individuals or clumps present. The intent of burning these areas would be to kill encroaching conifers and regenerating decadent shrub species. In addition to reducing fuels, this activity would increase forage value for a variety of wildlife species by preserving or increasing openings (early-seral habitats), and by replacing decadent shrubs with younger, more palatable stems.

Much of the remainder of proposed burn units are at higher elevations and are dominated by a dense conifer overstory: in most cases these are dominated by, or consist exclusively of, lodgepole pine that occupied sites after the 1910 stand-replacing burn. Large portions of these lodgepole stands are in a stem-exclusion structural stage (where few or no conifer regeneration is occurring) or in more open stands with a dense deciduous understory and only occasional regenerating conifers. Portions of these stands currently contain some huckleberries and other forage species, but are unlikely to be sustained in this condition over time (these stands are highly susceptible to insects and disease), and it is questionable if these huckleberries would remain in substantial densities. Martin (1983) reports that while 60-100 year old stands had fairly high huckleberry shrub cover, fruit production was significantly less than in 25-60 year old stands. In these cases, burning is intended to create small (about 10-acre) openings through high-intensity fire, which would then produce more high-value forage for grizzly bears, as well as ungulates and other browsers.

One of the more important effects to bear habitat as a result of the proposed burning would be the potential rejuvenation of huckleberry shrubs in burned areas. Huckleberries are an important food item

for grizzly bears in this portion of their range (Holden et al. 2012, Zager et al. 1983). Besides the sheer volume of fruits produced by various huckleberry species, these fruits ripen during late summer and fall when bears are undergoing hyperphagia (a condition of compulsive eating) in preparation for winter dormancy. Although they may be active from April through November, most grizzly bear weight gain occurs during the late-summer/fall while they feed almost exclusively on berries (Zager et al. 1983). In areas or in years of poor huckleberry productivity, body condition of affected bears can suffer, negatively affecting survival and reproduction.

While annual berry production can be highly variable depending on climate (particularly temperature), different vegetative types and structural stages also affect huckleberry production (Martin 1983, Holden et al. 2012). Martin (1983) reports that the most productive huckleberry plots were on mesic aspects with light tree canopies, and that production on mesic aspects (northwest through east) in general was significantly higher than that of xeric aspects (southeast through west). Martin (1983) also found that sites burned by wildfires 60-100 years ago did not produce much fruit, even though mean huckleberry shrub cover was moderately high (31%). In contrast, the mean production for plots on sites burned 25-60 years ago was significantly higher. Martin (1983) concluded that conditions that retard or inhibit the development of a tree canopy should prolong the productive life of huckleberries on burned sites.

Both Martin (1983) and Zager et al. (1983) agree that mature forests, particularly old growth, produce relatively low amounts of huckleberries regardless of overstory canopy cover. Zager et al. (1983) report that although grizzly bears use mature forests for escape cover, production and canopy cover of important food plants (especially fruiting shrubs) is relatively low on these sites. Instead, shrub communities, principally those at middle elevations, were identified as important producers of grizzly bear foods in northwestern Montana (Zager et al. 1983).

It is anticipated that prescribed burning would kill decadent overstory shrubs and occasional conifers to provide increased sunlight and growing space for establishment, regeneration and growth of various forage plants, including berries. The time period needed for huckleberry production to fully recover from burning could be anywhere from five to 25 years, depending upon fire intensity, fuel condition, soil moisture, burning season, and species. Where fire intensity is low (particularly spring burns), faster recovery is expected (since rhizomes would sustain less damage) but productivity may ultimately be shorter-lived. In areas where fire intensity is very high, huckleberry regeneration may take considerably longer, but productivity could continue for a longer time period (for example, the Trapper Peak and Sundance burns in the Selkirk Mountains – where sites burned in high-severity fires in 1967 still produce abundant huckleberries).

Alternative 2 also proposes prescribed burning in approximately 115 acres of dry-site old growth (burn units 2 and 3). These stands are relatively open, mature forest dominated by large-diameter ponderosa pine and Douglas-fir, with understories that are gradually becoming more congested with smaller trees and tall brush. In order to effectively burn these areas without causing unacceptable mortality to the mature tree component, it would be necessary to slash some of the smaller tree and brush understory on about 100 of these acres. This would be conducted by hand crews walking into the stands over several days at some point prior to burning. One of these units is accessed by open FSR 408, and the other is approximately one mile up trail 143. The disturbance created by slashing would be similar to that of precommercial thinning, but of shorter duration because fewer trees would require slashing.

Because of the steepness of the terrain and relative inaccessibility of the prescribed burn units, it is likely that most or all of the burn-only acres would be ignited using a helicopter. Disturbance during implementation would be limited to ten or fewer helicopter days per year. Aerial ignition would involve single, low passes over much of the area within units, with occasional breaks for the aircraft to return to the helibase for refueling and restocking of ignition materials. Depending upon conditions, this process

could be completed in a few hours of nearly constant activity, or could be intermittent throughout most of a daily burning period (up to 12 hours). The advantage to this method is that, under acceptable conditions, large acreages can be burned in a single day – decreasing the possibility that any single unit would be subject to this level of disturbance for more than one day. Indeed, several units of hundreds of acres could be ignited in one day under ideal conditions. The preferred method is to burn during the fall months if an acceptable burning window is available. However, due to a variety of factors outside Forest Service control (air quality constraints, acceptable weather, fuel moisture, and crew availability) some units may require spring burning (see "Design Features").

Helicopter use in grizzly bear habitat could have potential impacts to individual bears ranging from behavioral changes (such as displacement to areas away from the disturbance) to physiological changes, (increased heart rates and stress) (Larkin 1996, Reynolds et al. 1986). There is wide variability in the reaction of grizzly bears to aircraft disturbances (IGBC 1987). Factors influencing how a particular bear may react to aircraft include the availability of escape cover, the topography of the landscape, the degree of habituation to aircraft, and the type, noise level, altitude above ground, flight path and distance away from the aircraft (USDI National Park Service 2003).

More than 90 percent (approximately 6,760 acres) of the proposed burn-only units are in core habitat (figure 4). According to IGBC (1998), grizzly bear core habitat is primarily defined in terms of roads and motorized trails. Although the use of helicopters within core habitat represents a potential disturbance or impact to grizzly bears and their habitat, it does not represent a reduction or loss of core because it is a temporary intrusion and does not involve the motorized use of restricted roads or the construction of new roads. Helicopters do not pose the same long-term displacement effects and increased mortality risk to grizzly bears that are associated with permanent landscape features such as roads. The use of helicopters is transitory and does not bring additional human use and public access into grizzly bear habitat, whereas roads are generally longer term or permanent features on the landscape that do facilitate human access. However, helicopter use may displace grizzly bears from the area during the time that helicopter operations are ongoing and for some time after. Consequently, while helicopter use within grizzly bear core habitat would not require a deduction in the amount of core habitat, the potential temporary disturbance of grizzly bears has been considered and opportunities to reduce the impact have been incorporated.

The Montana/Northern Idaho Level 1 Terrestrial Biologists Team provided biologists with a Guide for analyzing potential effects of aircraft use on grizzly bears (USDA Forest Service and USDI Fish and Wildlife Service 2009). While the Guide does not attempt to make absolute effects determinations for various levels of helicopter use, it does discuss a number of factors that should be considered in the effects analysis. It is generally agreed upon that low-altitude helicopter flights (less than 500 meters above ground level) with or without landings may affect grizzly bears. If the effects of this use are not relaxed almost immediately (examples include "multiple trips, passes, or sweeps each day"), and use takes place in core habitat, this use would generally lead to an adverse effect determination.

There is little evidence indicating that grizzly bears (including cubs-of-the-year) are at risk of injury from fire (either wildfire or prescribed burning). The 1988 Yellowstone National Park fires provide useful information on the relative risk to bears from wildfire: of 21 radio-collared bears that had one or more of the fires within their home ranges, only one (a female with cubs of the year) could not be accounted for (USDI Fish and Wildlife Service 2003). All others apparently remained in or around the fire areas with no ill effects. Based on this example, it seems extremely unlikely that grizzly bears could be directly injured by burning activities proposed for the BCRP.

Burning of the areas closest to potential denning habitat (burn units 1, 6-8, and 9-11) is unlikely to take place before late-May, since fuels at these elevations (above 5,000') would not dry out sufficiently prior to this. By necessity, spring burning would take place before the area begins to "green up" with new

spring growth (to insure lower fuel moisture), so there would be little to attract bears to this site at this time. Burning of any given unit would take place during a single day, further reducing the possibility of a chance encounter. IPNF personnel would be intermittently present in the proposed burn area several days prior to burning, and at least one reconnaissance flight would take place immediately prior to lighting. Any wildlife making use of these areas would likely have moved away before actual burning operations begin.

Cumulative Effects Common to Alternatives 2 and 3

The following past, ongoing and reasonably foreseeable actions were considered in a cumulative effects discussion for grizzly bear:

Twentymile Project – Most of the activities proposed for the Twentymile Project take place in the neighboring Grouse BMU. Approximately 127 acres of timber harvest, and 150 acres of non-commercial treatments (precommercial thinning and shaded fuel break development) affected the Boulder BMU. The project also resulted in a core gain of about 152 acres (0.2 percent) and small (0.3 percent) reduction in TMRD in the Boulder BMU. OMRD temporarily increased in the Boulder BMU by one (1.0) percent during project implementation, mainly as a result of hauling on FSR 2260. At this time, timber harvest emanating from the terminal portion of 2260 (within the Boulder BMU) has been completed, and the remaining harvest along this road is in the Grouse BMU, and has little effect on OMRD in the Boulder BMU. As a result, this project can take place concurrently with Boulder Creek Project phases 1 and 2 while not exceeding the Boulder BMU OMRD standard. The Twentymile Project is expected to be completed prior to any phase 3 activity, so would not cumulatively raise OMRD above the Forest Plan standard during implementation of the Boulder Creek Project. Postharvest fuels treatments would be accomplished under administrative use limits, so would not affect road densities in the BMU.

Leonia Project – The Leonia Project authorized about 615 acres of timber harvest, plus temporary road construction affecting core habitat, in the Boulder BMU. However, the temporary core loss was compensated for by replacement core habitat of equivalent size and greater strategic value prior to project-related core impacts. Additionally, the net result of the project is a core increase of approximately 640 acres (one percent of the BMU) and TMRD reduction of about two percent. The project did not elevate OMRD above the Amended Forest Plan Standard of 33 percent during project implementation, and OMRD will return to baseline levels following cessation of project activities. Project activities that raise OMRD are expected to be completed prior to implementation of the BCRP, so would not cumulatively increase road densities. Postharvest fuels treatments would be accomplished under administrative use limits, and would not affect road densities in the BMU.

Activities on Private Lands – The Boulder BMU has substantial private ownership along the northwestern boundary. However, due to the highly roaded nature of these ownerships, they make little, if any, contribution to core habitat or low road densities in this BMU. As a result, there would be no additive cumulative effects to grizzly bears (with regard to core habitat or road densities) from these ownerships. The IPNF is currently unaware of any proposed activities on the patented mining claims in the eastern portion of the BMU that would be considered reasonably certain to occur, and the active mining claim in upper Boulder Creek ("Boulder Mine") receives infrequent vehicle use and small amounts of activity that are unlikely to result in considerable effects.

Public Activities - Personal use firewood gathering, non-motorized recreation, winter motorized recreation, dispersed camping and motor vehicle use of roads would not appreciably impact grizzly bears since none of these activities would elevate road densities or cause substantial habitat modifications. The BCRP would not exacerbate these uses or trend toward any threshold that negatively affects grizzly bears because public motorized access in the Boulder BMU during the active bear year would not increase.

Black bear hunting in the project area has the potential to displace or cause actual mortality (through mistaken identity, self-defense, or poaching) of grizzly bears. However, since there would be no increase in public motorized access in the BMU under any alternative, risk of mortality would not increase as a result of this proposal.

North Zone Roadside Salvage – This project proposes salvage of standing dead, down and live hazard trees on up to 570 acres, and roadside maintenance on approximately 50 acres, in the Boulder BMU. Approximately 123 of the roadside salvage acres are within proposed Boulder Creek harvest units, so this project could cumulatively add approximately 497 acres of roadside disturbance. The proposed salvage and maintenance would take place along currently drivable roads, and so would not increase motorized access. While activities associated with the project may provide an additional source of disturbance to bears that may be present during implementation, these activities would be spread out over a number of years and widely distributed across the BMU. As a result, this increase is unlikely to be discernible to bears (and would not be measurable) from the ambient levels of disturbance already present along selected roads. Changes to vegetative components of habitat (forage and hiding cover) would be inconsequential. Therefore, salvage would have minor effects to grizzly bears in the BCRP area.

Starry Goat Project – The Kootenai National Forest is proposing the Starry Goat Project in the Callahan BMU (BMU 9) immediately west of the BCRP area. Although the proposed Starry Goat activities are outside the cumulative effects area for grizzly bear (which is the Boulder BMU – see "Spatial and Temporal Context for Effects Analysis" section, above), road construction, decommissioning or storage, or other changes in designation (e.g., from "restricted" to "open") have the potential to affect neighboring BMUs if these roads are in close proximity to (within 900 meters of) the shared boundary. The only road in the Starry Goat proposal that meets this description is FSR 4401 – a currently restricted road segment that would be opened for a portion of the project. However, due to its location between two segments of open road (it is situated inside a broad curve in FSR 314/4402), this portion of Boulder BMU is already in a high (>1 mile/mile^2) open road density category. As a result, the Starry Goat Project would not cumulatively add to the effects of the BCRP on grizzly bear.

Conclusion

The Boulder Creek Restoration Project alternatives 2 and 3 would authorize long-term storage of approximately 11.8 miles of currently restricted roads (including one mile of road behind a guardrail barrier) and decommissioning of approximately 0.7 mile of currently open road. This would increase core habitat in the Boulder BMU by three percentage points and decrease TMRD by 5 percentage points, bringing the BMU up to the Forest Plan motorized access standards when fully implemented.

Open Motorized Route Density greater than 1 mile/mile^2 (OMRD) in the Boulder BMU would increase during each of the three separate harvest "phases" of the project, but would not exceed the Forest Plan standard of 33% during any phase. Once all harvest activities are completed (after an estimated six years), OMRD would return to the pre-project level of 29 percent. To reduce potential impacts to grizzly bears, all timber harvest, road reconstruction, road storage, grapple piling and slashing activities proposed in the BMU would take place outside of the grizzly bear spring season (April 1 – June 15); and the proposed temporary road off FSR 2113 would be constructed and used only during the denning (winter) season.

The project proposes approximately 3,139 acres of ground-based (tractor and skyline) timber harvest and 345 acres of helicopter harvest in the Boulder BMU. About half of the proposed harvest (approximately 1,771 acres) would be accessed by gated roads and would be subject to timing restrictions (phases). The remaining approximately 1,713 acres of harvest are concentrated near the western or eastern edges of the central portion of the Boulder BMU. Since most proposed units are adjacent to drivable roads, effects to

core habitat from timber harvest would be minimal. Nearly all (3,050 acres) of the proposed harvest is even-aged regeneration, but hiding cover would remain on almost 64 percent of the BMU following implementation. Regeneration harvest is expected to result in increased grizzly bear forage from both plant and animal sources. All post-harvest fuels activities (piling, burning, and planting) would remain within administrative use limits on restricted roads, and with the possible exception of helicopter ignition of helicopter harvest units, would be ground-based.

Both action alternatives also propose approximately 172 acres of burn-only units, precommercial thinning of approximately 806 acres, creation of a 22-acre fuel break near Black Mountain, and weed treatments along roads and turnouts – all outside inventoried roadless areas (IRAs). Vegetative changes to grizzly bear habitat from these activities would be minor (except possibly 172 acres of burning), and potential disturbance of bears from non-harvest activities would be inconsequential.

Alternative 2 proposes an additional 7,235 more acres of prescribed burning in inventoried roadless areas (much of it in core habitat), including about 100 acres of hand-slashing in two of the proposed burn units. This activity is expected to increase forage value for a variety of wildlife species by preserving, increasing or creating openings (early-seral habitats) in portions of the BMU where hiding cover is currently not limiting. Due to steepness of terrain and limited road access, most or all of the burn-only acres would be ignited using a helicopter. Although the reaction of grizzly bears to aircraft disturbances can be highly variable, the potential temporary disturbance of grizzly bears has been considered and opportunities to reduce the impact have been incorporated.

The BCRP would result in short-term (during implementation) disturbance to grizzly bears that may be present in the Boulder BMU, but would achieve long-term (after 8-10 years) improvements to grizzly bear habitat by increasing amount and size of openings (early-seral vegetation), rejuvenating vegetative forage species in treated areas, and by decreasing road densities and increasing core habitat in the BMU. Although the project is expected to have long-term beneficial effects for grizzly bears, potential disturbance and displacement of individual bears from project activities, along with the current (substandard) condition of the Boulder BMU, produce potential effects that are not completely insignificant or discountable. The determination of effects for grizzly bear as it relates to the Endangered Species Act can be found in the Wildlife Biological Assessment at the time of the final decision for this project.

Consistency with the Forest Plan

All alternatives comply with the following IPNF 2015 Revised Land Management Plan (USDA Forest Service 2015) standards for wildlife and habitat management regarding grizzly bears:

Standard FW-STD-WL-02. – *The Motorized Access Management within Selkirk and Cabinet-Yaak Grizzly Bear Recovery Zone Management Direction and ROD is included in [Revised LMP] appendix B, and shall be applied.*

- See "Forest Plan Appendix JJ (Motorized Access Amendment Direction)," below

Standard FW-STD-WL-04. – *No grooming of snowmobile routes in grizzly bear core habitat after April 1 of each year.*

- There is no grooming of routes in core habitat in the BCRP area

Guideline FW-GDL-WL-01. Grizzly Bear – *Management activities should avoid or minimize disturbance in areas of predicted denning habitat during spring emergence (April 1 through May 1).*

- Within the BCRP area, there is potential grizzly bear denning habitat at the higher elevations along Clifty Mountain/Katka Peak ridgeline, and at the upper elevations forming the southern

boundary of the BMU (Boulder/Middle/Timber mountains). The only project activities in the vicinity of these areas are proposed burn units. Although some of these units may be burned in spring, it is unlikely this would happen prior to the middle of May since these areas typically would not be snow-free prior to that date.

Guideline FW-GDL-WL-18. Grizzly Bear – *Elements contained in the most recent "Interagency Grizzly Bear Guidelines," or a conservation assessment once a grizzly bear population is delisted, would be applied to management activities.*

- The Interagency Grizzly Bear Guidelines (IGBC 1986) document directs the Forest Service to manage for "multiple land use benefits" to the extent that these uses are compatible with grizzly recovery. Management Situation (MS) 1 habitat is to be managed for grizzly bear maintenance and improvement and the minimization of grizzly-human conflict, and decisions would favor grizzly needs when habitat and other land uses "compete." Land uses that may affect grizzlies or habitat are to be made compatible with grizzly needs or eliminated. Alternatives 2 and 3 would be consistent with this direction by achieving a core habitat increase and TMRD decrease ("improvement") in the affected BMU. Although there may be a short-term (during implementation) adverse effect from potential disturbance as a result of project activities under these alternatives, grizzly bear habitat would ultimately be improved.
- Although timber harvest has the potential to negatively affect grizzly bears, this risk stems from: 1) removal of thermal, resting and security cover; 2) displacement from habitat during the logging period, and 3) increases in human/grizzly bear confrontation potential or disturbance factors as a result of road building and management (USDI Fish and Wildlife Service 1993). However, thermal and hiding cover are abundant and readily available throughout this portion of the IPNF. While alternatives 2 and 3 propose temporary increases in OMRD as a result of road construction/reconstruction and use of currently restricted roads as haul routes, these roads would be unavailable for public use (so are not expected to increase the risk of direct mortality) and would not be used during the time period (spring) when grizzly bears are most vulnerable. Currently stored roads that are reconstructed for project implementation would be returned to a stored condition, and temporary roads would be obliterated, following project activities under both action alternatives. Timber harvest can also have long-term (post-implementation) beneficial effects for bears by increasing growth of palatable forbs, berries, and grasses (USDI Fish and Wildlife Service 1993), or by increasing resident ungulate populations that can provide carrion for scavengers. IGBC (1986) states that "grizzly habitat quality can probably be increased or enhanced by creating openings producing high quality grizzly food facilitating greater grizzly use in forest habitat where normal grizzly use appears light." As a result, alternatives 2 and 3 are compatible with grizzly habitat needs, and are compliant with this guideline. Compliance with specific guidelines from IGBC (1986) is documented in the project file.

Forest Plan Appendix JJ (Motorized Access Amendment Direction)

Design Element I – Design Element I sets motorized access standards (percent core, total motorized route density and open motorized route density) for individual bear management units in the Selkirk and Cabinet-Yaak Recovery Zones. Compliance with these standards is discussed in detail under effects of the action alternatives, above. In summary:

A. Access management standards for the Boulder BMU are set at 33/29/55 (OMRD/TMRD/core) percent of the BMU. The current condition for the BMU is 29/31/52 percent.

B. Once fully implemented, the Boulder Creek Project will result in 55 percent core habitat in the BMU. Core areas in the Boulder BMU contain no motorized travel routes, high use trails, or

drivable restricted (gated) roads. The core areas created by this project would include a full range of seasonal grizzly bear habitats. Fifty-four (54) percent of the BMU would be in core blocks far in excess of 8 square miles. Roads closed to create core habitat will remain so for at least 10 years, except for emergency circumstances. See "Core habitat and TMRD" discussion for details.

C. The Boulder BMU is anticipated to meet access management standards through implementation of alternatives 2 and 3. Implementation of alternative 1 would not meet access management standards for this BMU.

D. n/a

E. Timber harvest activities on three restricted road systems would exceed trip limits for two years during each "phase" of implementation. Each road system would be modeled as "open" during the years that respective phase is active. See "OMRD" discussion for details.

Design Element II. – Access management design elements listed under heading II apply only to recurring use areas (i.e., BORZ areas) located outside the Cabinet-Yaak and Selkirk recovery zones on the IPNF.

- No BORZ areas would be affected by this proposal.

Design Element III. – *To ensure the effective implementation of the open road density parameter, at least 30 percent of closure devices (gates and barriers) will be monitored annually within the respective ecosystems. Monitoring techniques may include visual checks as well as road counters.*

- Closure monitoring is summarized and reported annually to U.S. Fish and Wildlife Service (see project file for most recent report) In the 2016 Bear Year, 45 percent of closures in the Cabinet-Yaak Recovery Zone, and 64 percent of closures in the Selkirk Recovery Zone were monitored. Many of these closures were inspected multiple times throughout the snow-free season. Monitored closures are assumed to be effective unless inspections reveal evidence of breaching. In these situations, repairs are made in a timely basis, and core or OMRD deductions taken where appropriate. Monitoring and inspection data are available at District offices.

Sensitive Species

Fisher

The BCRP would regenerate stands that provide potentially suitable fisher denning/resting habitat, but this represents a relatively small proportion of this habitat in the analysis area. While the mature forest in the BCRP area would also be affected, about 80 percent of the area would remain in a large, interconnected patch of 60+ year old forest following project implementation. Although the open areas of the two hypothetical fisher homeranges in the BCRP area would increase by 2, and almost 6, percent, this would also increase the diversity of habitats within these home ranges. Road storage would reduce potential trapper access and attendant risk of trapping-related mortality. Project activities may impact fisher habitat at a localized scale, but they would not substantially affect species population or distribution at larger scales, and would have inconsequential effects relative to natural changes expected to take place over the coming decades.

Habitat Relationships

Fishers are low density forest carnivores, occurring most commonly in landscapes dominated by late-successional forests with high cover, especially in riparian areas (Powell and Zielinski 1994). Fisher distribution in the western United States is consistently associated with low to mid elevation forests

(Zielinski et al. 2010, Spencer et al. 2011). Fisher habitat in the Rocky Mountains generally consists of mature and old-growth conifer forests in summer and young, mature and old-growth forests in winter (Heinemeyer and Jones 1994).

Contrary to what was once thought, recent research in western North America indicates that fisher are not old-growth conifer dependent and that their home ranges are characterized by a mosaic of forest types and seral stages, including high proportions of mid to late seral stands (42 percent to 72 percent of a home range) as well as lower proportions of open or non-forested stands (Raley et al. 2012). Based on a synthesis of research on fisher in western North America, Raley et al. (2012) contend that when establishing their home ranges, it benefits fisher to include a diversity of forest conditions. This increases their access to a diversity and abundance of prey species that use different forest conditions, while at the same time providing the habitat features the fisher themselves need for reproduction and thermoregulation.

Large-diameter snags and logs are used for denning, resting and foraging; and the structure of habitat (i.e., complex vertical and horizontal structure with larger live trees, snags and logs) is more important to fisher than any particular forest types (Raley et al. 2012). Fisher prefer forests with high canopy closure (greater than 80 percent) and generally avoid areas with less canopy closure (less than 50 percent) (Powell 1982). Forests within or adjacent to riparian areas are particularly important to fishers (Heinemeyer and Jones 1994). In his study in north-central Idaho, Jones (1991) found that during the summer fishers generally preferred grand fir and spruce forests, and avoided dry ponderosa pine and Douglas-fir habitats. However, in winter, fishers also selected stands with relatively high basal areas of Douglas-fir and lodgepole pine.

Affected Environment

Fishers historically occupied much of the forested habitats in the northern United States (Heinemeyer and Jones 1994). Populations declined in the early 20th century, due mainly to over-trapping and poisoning. Habitat loss as a result of human settlement in low-lying areas likely contributed to population declines as well (USDI Fish and Wildlife Service 2011b). In the western United States, fishers have remained at low numbers or absent from portions of their former range (Heinemeyer and Jones 1994). Population trend information for fishers in northern Idaho is unavailable, but based on sighting information fishers are currently uncommon. However, the status and distribution of the historic (pre-settlement) fisher population is equally unknown, and populations were likely never as abundant as in the east. The absence of historic population estimates, along with a lack of current numbers or trends, do not allow for a comparison of the impacts of landscape-scale changes on fisher populations (USDI Fish and Wildlife Service 2011b).

Changes to forest structure due to natural and human-caused disturbances (such as fire or timber harvesting) can negatively impact habitat for fisher, particularly when they affect late seral mesic forest types and forested riparian areas. Past logging activities throughout the Kootenai River basin, including salvaging of occasional large stems, likely deteriorated fisher habitat by removing forest canopy, snags, and current and future dead and down material.

Most studies have found fishers tolerant of moderate degrees of human activity including roads, although Heinemeyer and Jones (1994) hypothesized that roads may indirectly lead to increased trapper access. Fisher cannot be legally trapped in Idaho, but are occasionally caught in sets intended for other species (such as marten and bobcat).

Fisher presence has historically been documented within the Boulder Creek drainage. Intensive surveys from 2010-2014 detected fisher presence in 11 locations within or immediately adjacent to the BCRP area from at least 7 individual fishers (4 males, 3 females) (Lucid et al. 2016).

Approximately 38,210 acres of the 40,630-acre analysis area are considered capable fisher habitat (see "Methodology" subsection, below). Much of the BCRP area is in large, interconnected expanses of mature or late successional forest dating back at least to the 1910 burn. Forest records show that approximately 5,349 acres in the BCRP area have undergone timber harvest since the late-1950s, including about 2,735 acres of regeneration harvest. About 83 percent of the BCRP area has no record of timber harvest. Currently, about 87 percent (35,400 acres) of the analysis area is comprised of forest stands more than 60 years old, and about 28,400 of these acres (70 percent of the BCRP area) are more than 100 years old - including approximately 4,187 acres of old growth.

Environmental Consequences - Fisher

Methodology

Fisher habitat was evaluated based on habitat requirements documented in published literature, and discusses possible project effects at multiple spatial scales. Fine scale habitat analysis addresses potential denning/resting sites and the stands that support them. These areas are important because they are thought to be critical for fisher reproduction and survival (Raley et al. 2012). Larger scale analysis (home range or landscape) may be a better predictor of fisher presence, and is more appropriate for assessing effects of forest management (Sauder and Rachlow 2014).

Denning/Resting

Proposed harvest units were assessed based on their ability to provide denning or resting sites for fishers. The concept of "capable" habitat is used here to identify those stands that could, at some point in time, provide these features, and included virtually all of the forested stands in the BCRP area.[10] Areas of capable habitat that appeared (from habitat evaluation surveys) to contain the attributes selected by fishers for denning or resting sites were considered "potentially suitable" denning/resting habitat. This habitat component was defined as capable forested stands with canopy closure greater than 40 percent, all forest types except ponderosa pine, and average stem diameter in the primary overstory layer greater than 15 inches d.b.h. (10 inches d.b.h. in lodgepole pine, aspen or birch stands). In addition, stands were only considered potentially suitable denning/resting habitat if they contained either large (greater than 15 inches d.b.h.) snags or large-diameter down woody debris (preferably both).

Canopy closure of greater than 40 percent is based on Jones' (1991) finding that fishers in his study area preferred stands with canopy cover greater than 60 percent, avoided stands with canopy cover less than or equal to 40 percent, and used stands with 41 to 60 percent canopy cover in proportion to availability when selecting resting sites. The use of 15 inches or greater average diameter in the primary overstory layer is a proxy for what Jones (1991) described as "mature forest" and "old-growth" stands in his study area (size classes that were not avoided by his study animals selecting resting sites). This diameter limit was lowered for lodgepole pine, aspen and birch to acknowledge that older stands of these species generally reach smaller diameters; but the required presence of large snags or down wood eliminates younger, less structurally complex stands as suitable habitat. Jones (1991) found most resting sites to be in the canopies of live trees, but large snags and down logs were preferred as maternal dens.

[10] only non-forested stands and forested stands at the opposite extremes of the environmental gradient ("cold" and "warm-dry") were excluded

Habitat evaluation surveys conducted by Forest Service wildlife personnel during 2013 and 2014 examined approximately 9,382 acres in the analysis area. Using the information from these surveys, stands proposed for treatment were analyzed individually to determine if they contained the habitat parameters necessary to be considered potentially suitable for denning/resting. Project effects were determined by predicting the change in habitat suitability that would result from each alternative.

Landscape/Homerange

Recent research has focused on habitat analysis at larger scales (landscape or individual fisher home ranges) as predictors of fisher occurrence (Raley et al. 2012, Sauder and Rachlow 2014, 2015). Raley et al. (2012) report fisher home ranges containing relatively high proportions of mid- and late-seral forest (42 to 72 percent). Sauder and Rachlow (2014) also focused on forest pattern at the landscape scale, and predicted that an increase in the amount of open area on the landscape from 5 to 10 percent would reduce the relative probability of occupation by fishers by 39 percent. However, they also report that the configuration (sizes and distance between) mature forest patches was the most important habitat variable to predict fisher occurrence.

Raley et al. 2012 define "mid-seral" according to Zielinski et al. 2004 as "early mature, early mature-with predominants, early mature-harvest with predominants, and early mature-harvest types." For the BCRP analysis, mid- to late-seral forest was considered to be any forest stand more than 60 years old. Stands of this age also likely meet the Sauder and Rachlow definition of "mature forest" (i.e., trees of 25-50 meter canopy height) in the project area. The analysis used the timber stand database to estimate the amount and distribution of mature forest in the project area both before and after project implementation under both alternatives. The analysis did not attempt to duplicate the Sauder and Rachlow (2014) proximity index approach, instead merely mapping forest cover pre- and post-implementation to assess project effects on mature forest configuration.

To evaluate the amount of open area in the BCRP area both before and after project implementation under both alternatives (using Sauder and Rachlow's 2014 definition of "open areas" as those with canopy cover less than 10 percent), the analysis employed the Regional VMap database, as this generally provides reliable estimates of canopy cover.

Alternative 1 - Direct and Indirect Effects

The no action alternative would provisionally preserve currently suitable denning habitat for fisher, and may bring some stands into suitable denning condition more rapidly than treatment would in the absence of large disturbances. However, these stands would be more vulnerable to insect infestations and disease; and would also be at slightly increased risk of stand-replacing wildfire, which would effectively remove severely burned-over areas from suitable fisher denning habitat for up to 100 years. While the no action alternative would provide better habitat than the action alternatives in the near future, this habitat is not expected to persist over time. Habitat modeling conducted for the 2015 revised Forest Plan determined that habitat would slowly decrease over the next five decades in the absence of activity, largely as a result of wildfire and root disease (USDA Forest Service 2013a).

Many of the stands heavily impacted by the 1910 burn currently contain high amounts of lodgepole pine and are lacking in large snags and down woody debris. Given that lodgepole pine rarely grows large enough in this area to provide large snag habitat and woody debris (e.g., greater than 15 inches d.b.h.), and that these areas often lack remnant large snags and woody debris from previous stands, it is questionable if they would become suitable denning habitat absent a stand replacing event. Some of these same stands may become suitable in a shorter time period than if they were treated, assuming they have adequate numbers of green trees of other species and the lodgepole pine component of the stand does not suffer from high mortality that reduces canopy below 40 percent in the time needed for stems of other

species to reach the large size class (although this is a common fate of lodgepole pine-dominated stands on the North Zone). However, most would likely slowly transition from lodgepole pine to other shade-tolerant species that, depending upon disturbance events, may require more than the expected time frame for regenerated stands (100 years) to reach suitable condition, if achieved at all.

Other currently unsuitable areas consist of mixed conifer stands slowly being taken over by late-seral, shade tolerant, short-lived tree species. In the absence of disturbance, this trend away from early seral, shade intolerant, longer-lived species will continue. While some of these stands may reach a suitable denning habitat condition over time, they would not be expected to maintain this condition for as long as stands containing more shade-intolerant, longer lived species which are less susceptible to insects, disease and lethal fire.

Fire suppression activities are generally good for fisher habitat in the short term (5-10 years), as they protect denning habitat from stand-replacing fire and contribute to understory congestion in dry-site stands that provide cover for small mammals that fishers prey upon. However, this activity can also slow the development of quality late-successional habitat where it does not currently exist by encouraging growth of higher densities of smaller-diameter shade-tolerant species and contributing to higher incidences of insects and disease. This can result in fuel loading that may cause larger, hotter future wildfires. As a result, fire suppression benefits this species in the short term by helping preserve mature forest cover, although the longer-term effect may ultimately be a deterioration of habitat quality and quantity.

The BCRP area currently contains about 35,400 acres of well-distributed and connected mature forest habitat (about 87 percent of the analysis area) (figure 5). Approximately 3,600 acres (9 percent) of the project area currently has less than 10 percent canopy cover. Most of these openings are not the result of human activities, but rather encompass large areas of bare rock and thin (treeless) soils at upper elevations in the BCRP area (figure 6). Since this alternative would not authorize any activities in fisher habitat, it would have no direct or indirect effects on these species, although the changes discussed above would continue to influence species presence and distribution.

Direct and Indirect Effects Common to Alternatives 2 and 3

Denning/Resting Habitat

Habitat surveys on nearly 9,400 acres in the BCRP area identified approximately 1,820 acres of potentially suitable denning/resting habitat in or near proposed activity areas. The action alternatives propose timber harvest on approximately 3,370 acres of capable fisher habitat. This includes about 2,811 acres of seedtree harvest, 125 acres of shelterwood harvest, and about 434 acres of group selection. Proposed regeneration harvest includes up to 695 acres in stands that provide potentially suitable fisher denning/resting habitat (all seedtree harvest). Regeneration harvest would revert habitat to an earlier successional stage where it would no longer be considered potentially suitable for denning or resting.

To put these effects into context, more than 60 percent of the potentially suitable denning/resting habitat in the vicinity of proposed harvest units would remain unaffected. Potentially suitable denning/resting habitat would persist (outside harvest areas) in the vicinity of units where this habitat component is lost. In the North Creek area, which contains most of the potentially suitable habitat acres to be treated, more than 700 acres of potentially suitable habitat (as determined by habitat evaluation surveys) would not be affected. Also, habitat evaluation surveys occurred on less than one-quarter of the capable habitat in the BCRP area. Given the relative uniformity of the area in age and stand structure, it is reasonable to believe that similar amounts of suitable denning or resting habitat remain on the 75 percent of the BCRP area not in proximity to proposed harvest.

Figure 5. Mature (> 60 year-old) forest cover (green) in the Boulder Creek watershed before (left) and after (right) Boulder Creek Restoration Project implementation

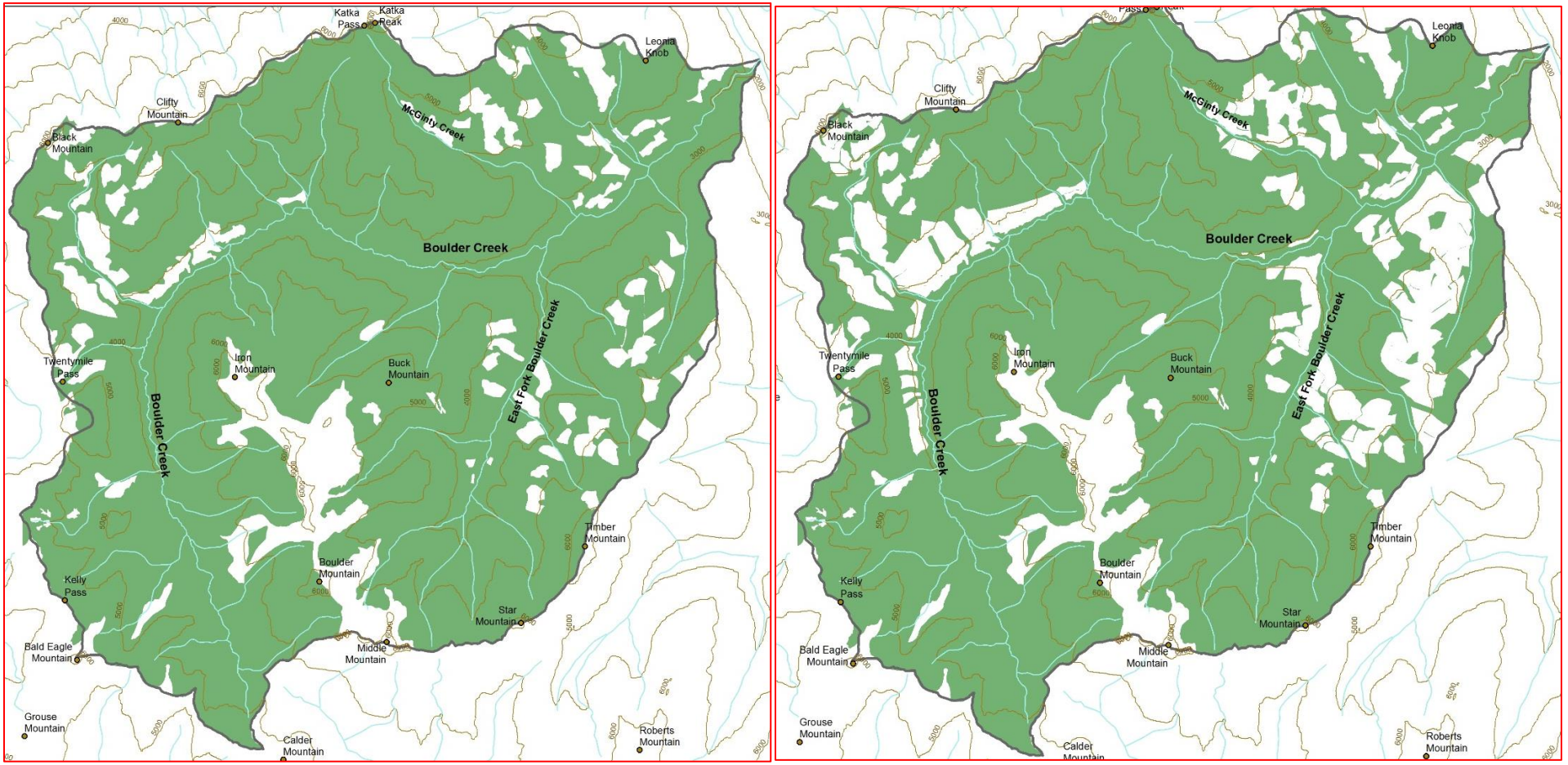
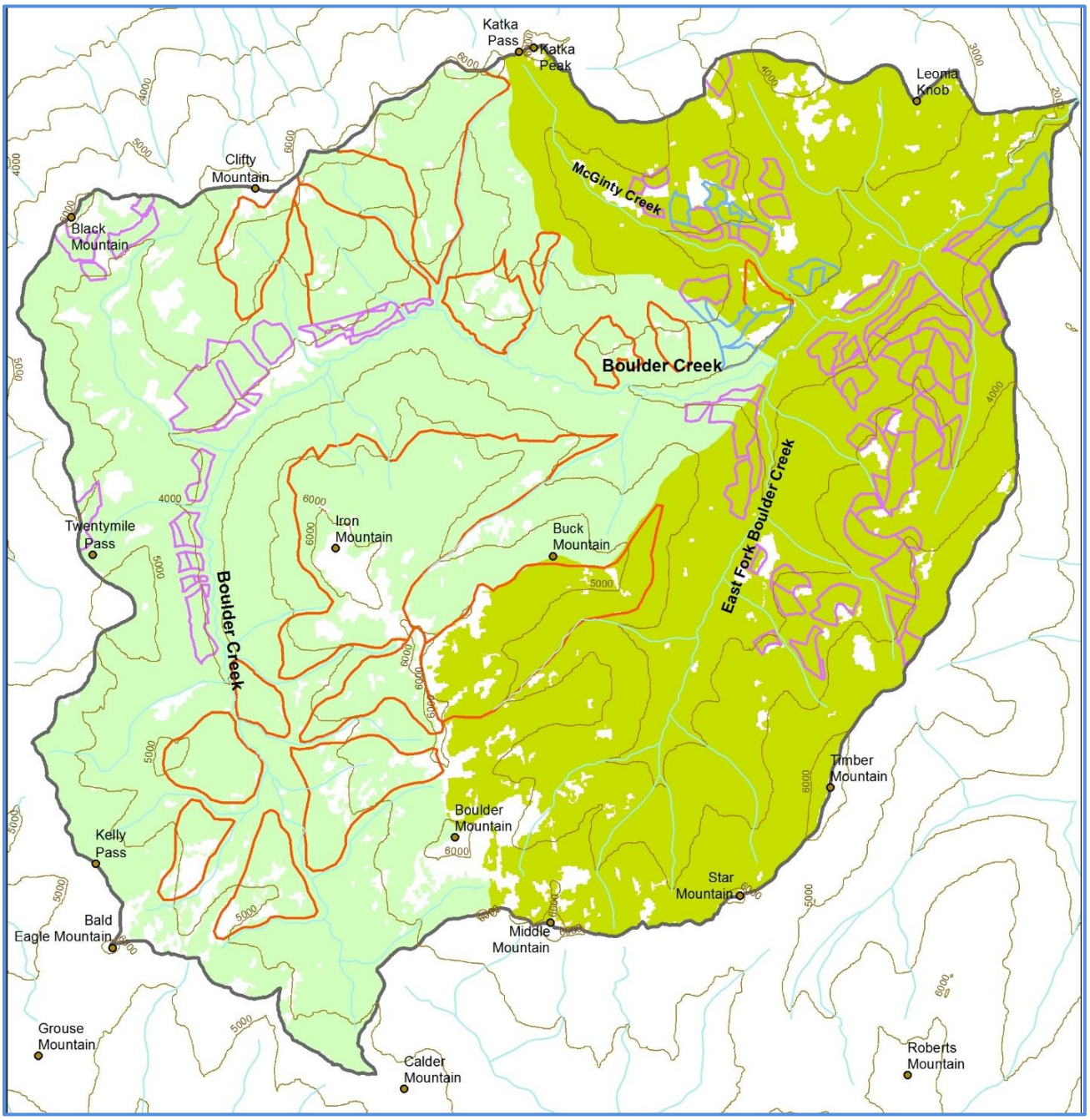


Figure 6. Existing openings (< 10% canopy cover) in the upper (light green) and lower (olive) Boulder subwatersheds. Proposed harvest units are outlined in purple, and proposed (alternative 2) burn-only units outlined in red



We are not aware of any published habitat recommendations, or "thresholds," for the amount of denning/resting habitat required per home range by individual fishers. While it may be desirable to have a number of alternate sites for resting (or for maternal dens) in case the preferred site is altered or disturbed, it would seem counterproductive to have an entire home range consisting of this habitat. Stands that meet this description (older, somewhat decadent forest) usually contain less diversity and quantity of prey species. Recent studies (Raley et al 2012, Sauder and Rachlow 2014, 2015) agree that habitat heterogeneity and diversity is important to fishers (see "Landscape/Homerange" discussion, below). Given that fishers are low-density carnivores with relatively large home ranges, it would seem advantageous to have clusters of denning/resting habitat distributed throughout the home range, rather than large amounts concentrated in only a portion of a home range.

Regeneration harvest of stands that are not currently suitable denning/resting habitat would similarly set them back to an earlier successional stage that would probably require between 50 and 100 years (depending upon how many residual green trees remain after harvest) to reach suitable condition. Some stands may reach suitable condition more rapidly if left untreated (see "Alternative 1" discussion, above). However, treated stands would have considerably higher proportions of long-lived seral species, and subsequently would remain in suitable condition (once attained) for a longer period of time as they would be more resistant to insects and disease, weather events, and fire.

Landscape/Homerange Analysis

Approximately 3,278 acres of mature (more than 60 years old) forest are within proposed timber harvest units, including 403 acres of group selection, 2,751 acres of seedtree harvest, and 125 acres of shelterwood harvest. Assuming about one-third of the areas within group selection units are regenerated, this would reduce the amount of mature forest in the BCRP area to about 32,390 acres (80 percent). This figure still exceeds the Raley et al. (2012) recommendation for the amount of mature forest in a home range.

While the proposal would create a few large areas of less than 60-year-old forest (particularly in North Creek area), the remaining mature forest would still be interconnected. With a few exceptions, the BCRP area would essentially consist of one large "patch" of mature forest its entire length (figure 5). As a result, the proposed timber harvest would leave a well-connected mature forest pattern recommended for fishers.

Timber harvest also has the potential to increase the amount of open area in the BCRP area, although predicting the actual extent is problematic. Sauder and Rachlow (2014) narrowly define open areas as having less than 10 percent canopy cover, which is the middle of the range of expected residual canopy cover (5-15 percent) of seedtree units. Post-harvest condition of all shelterwood units and two-thirds of group selection units would not be considered open areas under this definition. Assuming that approximately one-half of acres harvested in seedtree units are reduced to less than ten percent canopy cover, the proposal would result in an approximately 1,526-acre (3.6 percent) increase in open areas (about 1,392 acres of seedtree harvest plus 134 acres in group selection units).[11]

To place this in better context, the analysis area was subdivided into two hypothetical homeranges divided along subwatershed boundaries (Upper Boulder and Lower Boulder) (figure 6). At about 22,301 acres (Upper Boulder) and 18,276 acres (Lower Boulder), these areas generally approximate, in size, the midpoint of average male and female fisher home ranges reported by Sauder and Rachlow (2014) (males: 24,315 acres, females: 12,182 acres).

[11] Approximately 102 acres of proposed harvest (33 acres group selection and 69 acres seedtree) are in areas identified by VMap as having less than 10 percent canopy cover

The Upper Boulder subwatershed currently contains about 2,174 acres (9.7 percent) of open areas, which would increase by 2 percent as a result of proposed timber harvest. The Lower Boulder subwatershed currently contains about 1,436 acres (7.8 percent) of openings, increasing to 13.7 percent from proposed timber harvest.

Sauder and Rachlow (2014) suggest that managing for less than 5 percent open areas could serve as a target for managers seeking to maximize fisher occupation. It is unclear how this recommendation is to be applied to management activities, since natural openings often comprise more than five percent of landscapes (the majority of the 9 percent open areas in the BCRP area are natural openings). Additionally, this would seem to be in conflict with the Revised Forest Plan Desired Conditions that call for "a range of patch sizes that have a diversity of successional stages" and an increase in size of forest patches dominated by seedling/sapling and large size classes, and associated decrease in size of patches with small and medium-sized trees (FW-DC-VEG-05).

However, Sauder and Rachlow (2014) seem to imply that a diversity of habitat in home ranges may (at some level) be more important to fishers than amount of open area, stating that "having a variety of habitat patches within a matrix of well-connected mature forest was a forest pattern favored by fishers." This is also supported by the Raley et al. (2012) recommendation for 42 to 72 percent of mid- or late-seral forest (implying up to 48 percent of something else), and Sauder and Rachlow (2015) reporting core use areas containing "moderate" amounts of high canopy cover forest. All of these research articles generally support the supposition that habitat heterogeneity and diversity is important to fishers. The BCRP would increase diversity (in structure and composition) of forest stands while maintaining connectivity of mature forest patches, despite the relatively small increase in open areas.

Other Project Activities

The project proposes approximately 806 acres of pre-commercial thinning of capable habitat within the analysis area. Thinning young, small diameter trees would be designed to increase the overall health and vigor of the stands. This has the potential to temporarily reduce densities of prey species such as snowshoe hares, but is designed to produce stands with lower densities of large diameter trees that would potentially create improved fisher denning habitat when they fully mature.

Post-harvest fuels treatments (burning and piling) would have relatively minor effects on fishers. The species is not particularly sensitive to disturbance, and regenerated units are unlikely to be extensively used by fishers following harvest. Both burning and grapple piling would reduce availability of coarse woody debris, but these stands would not be used for denning for a number of years after harvest due to inadequate canopy cover. Additionally, approximately one slash pile per 5 acres would be left in most piled units to provide habitat for snowshoe hares and other small mammals fishers prey upon (see "Design Features" section). Sullivan et al. (2012) report significant increases in diversity and abundance of small mammals associated with woody debris arranged in large piles on harvested sites.

Proposed road storage would make small improvements to fisher habitat by reducing the miles of roads potentially available to trappers during the winter, and subsequently slightly reducing the risk of trapping mortality. Temporary roads and roads reconstructed for project purposes would not be made available for public use, and would be closed following project implementation.

Spraying herbicides to control and prevent noxious weeds could take place along roadsides, on trails, and at other locations in the analysis area. It is unlikely that noxious weed treatments would have any impacts on fisher because they would not cause changes in important fisher habitat components, and the species is not particularly vulnerable to disturbance.

Construction of a fuel break near Black Mountain would have minor effects to fisher habitat because the area currently does not provide mature forest habitat. Similarly, creation of a trailhead at the west end of the River Walk trail and converting FSR 1304G to a non-motorized trail would have little or no impacts on fishers, since these activities would make little (if any) changes to existing human use or fisher habitat.

Alternative 2 - Direct and Indirect Effects

Proposed burning only under alternative 2 could affect up to 7,407 acres in the BCRP area. The effects to fishers from this activity are difficult to predict, but are unlikely to impact the species in substantial ways:

- Stands providing potential denning/resting habitat would not be targeted for burning, and are unlikely to burn with high severity (these stands provide relatively more shade and moisture than surrounding areas) if fire were to enter them.
- Open areas (shrubfields and treeless areas) comprise a substantial portion of the proposed burn units, and high severity fire in these areas would have little effect on fisher habitat.
- Most burning would take place in higher-elevation areas. Effects to low- to medium-elevation mesic forests and riparian areas (preferred fisher habitat) are not expected.
- Although the intent of much of the proposed burning is to increase the size of existing openings and occasionally create new openings within areas of homogenous forest (usually lodgepole pine stands), most of the affected areas would be smaller-diameter trees encroaching on historic openings, or dense lodgepole pine stands with depauperate understories that provide limited foraging (and poor denning/resting) habitat for fishers. While these enlarged or newly created openings may hinder fisher travel somewhat, the habitat effects would be minor.
- Fishers are not particularly sensitive to human disturbance, and would be expected to merely move away from affected sites during burning operations.

Finally, proposed burning is designed to diversify habitats compared to the existing condition. This should result in increased populations of small mammals and other items that fisher prey upon.

Cumulative Effects Common to Alternatives 2 and 3

The following past, ongoing and reasonably foreseeable actions were considered in a cumulative effects discussion for fisher:

Public Activities – Personal-use firewood gathering is anticipated to continue along seasonally and yearlong open roads, potentially reducing snags within 200 feet of such roads. Although it is unlikely to disrupt normal fisher use patterns, firewood cutting can deteriorate habitat in these roadside areas by removing large snags that represent future dead and down wood denning opportunities. Various recreation activities are unlikely to impact fishers, with the exception of oversnow motorized vehicle travel that can provide access for trappers. The effects of oversnow motorized vehicle use, as well as trapping itself, are characterized by the analysis of changes in motorized route miles. This proposal would not increase over-snow motorized vehicle use above current levels, and may reduce this use when currently drivable roads are placed into long-term storage. Therefore, the risk of trapping mortality would not increase as a result of this proposal. Other public recreation activities are unlikely to impact fishers.

North Zone Roadside Salvage – This proposal could salvage small pockets of dead and dying or down trees in the project area. However, roadside salvage would not affect allocated old growth, and would generally only remove pockets of down trees adjacent to open roads. As a result, the habitat potentially affected by this activity would not be of great value to fisher. Cumulative effects from this activity overlap those discussed in for firewood gathering and are minimal, and thus would not result in consequential additional effects.

Scientific Uncertainty and Opposing Science

The effects of timber harvest on fisher populations over multiple spatial and temporal scales is an interesting question. Research has unequivocally demonstrated that, at the local scale, logging can negatively impact habitat for fisher, particularly when it affects late seral mesic forest types and forested riparian areas (see, for example, Ruggiero et al. 1994). Timber harvest can reduce forest canopy, remove snags, and diminish current and future dead and down material. Although fisher may use previously harvested stands for foraging and denning/resting sites, unharvested stands are preferred for denning.

Even so, while most fisher habitat (both current and historic) in the western United States is under Forest Service management, it has been suggested that timber harvest on National Forest System lands in the Northern Rockies is unlikely to have contributed to fisher population declines in any considerable way. The U.S. Fish and Wildlife Service has noted that fisher populations declined precipitously in the 1920s, but the balance of forested habitat (outside of dry-forest types) in Idaho and Montana showed little or no logging activity before 1940 (USDI Fish and Wildlife Service 2011b). This document goes on to state that "Fishers were so rare as to be considered extirpated before large-scale [timber] harvesting occurred" in the region.

Management actions in the Forest Service Northern Region in general, and the IPNF in particular, have been criticized for perceived reductions of fisher habitat and failure to properly account for the effects of these reductions (both past and present) on fisher populations (Center for Biological Diversity et al. 2013, Shultz 2012). However, the following information does not support these arguments:

- In a petition to list the Northern Rocky Mountain Range DPS of fisher under the ESA, the Center for Biological Diversity and others (2013) cited timber harvest and forest management as a current threat to fisher survival, pointing out that a total of more than 626 million board feet of timber were removed from seven National forests between 2009 and 2012. While this figure seems high, when placed in context logging actually impacts relatively small portions of the affected forests. Across the entire Northern Region of the U.S. Forest Service (R1), 12,662 acres of about 223,512,200 acres (0.0056 percent of the forested landscape) were subject to timber harvest in 2012. On the IPNF, timber harvest affected about 1,645 of 2,470,384 forested acres (0.067 percent). For the 10 year period from 2003-2012, total timber harvest was 165,006 acres in R1 (0.074 percent), and 23,329 acres on the IPNF (0.94 percent).[12] More recent reports show that timber harvest has increased somewhat since 2012, but still comprises a fraction of the land base at both scales.
- Additionally, the average annual timber harvest on the IPNF from 2009-2012 (about 23 million board feet) equates to less than 6 percent of the approximately 405 million board feet the forest is estimated to grow each year. At this rate of harvest, it would take the IPNF nearly 17 years to harvest a single year's growth. It is likely that fisher resting/denning habitat is being created on the forest at a much greater rate than it is being lost through timber harvest.

[12] http://www.fs.usda.gov/Internet/FSE_DOCUMENTS/stelprdb5403648.pdf

- The IPNF has not conducted timber harvest or other management that removed allocated old growth stands for more than 20 years (and the amount of old growth lost through wildfire or other natural disturbances has been minimal) (USDA Forest Service 2010), and the 2015 Revised Forest Plan prohibits loss of old growth through management activities. Also, recent timber harvest on the forest has placed an increased emphasis on harvest of small-diameter and late-seral tree species, and has essentially eliminated clearcutting as a harvest method. It is reasonable to assume that, across the larger landscape, fisher is not threatened by habitat modification resulting from timber harvest on the IPNF.
- Schultz (2011) states that "Without any thresholds to provide some context for projects that eliminate small portions of [fisher] habitat, there is no clear basis for asserting there are no significant cumulative effects." However, based on discussion above, localized project effects are essentially being negated at larger spatial and temporal scales, so the case for inconsequential cumulative effects can be made even in the absence of habitat thresholds (if they existed).
- As discussed above, it is unknown if any thresholds for the amount of denning-resting habitat required per home range by individual fishers exist (i.e., how much is enough?). Similarly, while Raley et al. (2012) and Sauder and Rachlow (2014) provide suggestions for individual home ranges, the larger question remains unanswered: how many such home ranges are required for the species to persist? Based on historic estimates ("HRV" – see USDA Forest Service 2013a), it is highly unlikely that the entire landscape met the Sauder and Rachlow (2014) "5 percent opening" condition at any time, yet fisher were present prior to western settlement. Apparently some (currently unknown) proportion of the landscape is required in acceptable home ranges to maintain populations. While the validity of a Northern Region-sponsored viability analysis (Samson 2006a, 2006b) has repeatedly been questioned (see Schultz 2011), no other scientifically sound, quantitative minimum viable population determinations for the various species studied – independent or otherwise – has been produced that would supplant this assessment. The analysis provides credible evidence that viability is being maintained in the Northern Region (see "Conclusion" below).

Regarding fisher population trends, the U.S. Fish and Wildlife Service (2011b) stresses that historic population estimates and current estimates and trends are generally lacking in the region, and attempting to perform population estimates on a secretive, solitary, and low-density carnivore at the project (or even Forest) level would be of limited value. In fact, even the comprehensive sampling undertaken by Lucid et al. (2016) represents but a piece of the larger picture (essentially a snapshot in time that could provide a baseline for long-term monitoring).

Conclusion

The BCRP would regenerate up to 695 acres in stands that provide potentially suitable fisher denning/resting habitat (all seedtree harvest). This represents about 40 percent of this habitat in stands that received field evaluation of habitat, which in turn are only about 25 percent of the analysis area. It is reasonable to assume that the remaining 75 percent of the area consists of similar quantities of this habitat, and that the effects of this change would be of minor consequence.

Alternatives 2 and 3 would also harvest approximately 3,278 acres of mature (more than 60 years old) forest in the BCRP area, but about 80 percent of the area would remain in a large, interconnected patch of 60+ year old forest following project implementation. The project would also increase the open areas of the two hypothetical fisher homeranges in the BCRP area by 2, and almost 6, percent. However, this would also increase the diversity of habitats within these home ranges, consistent with research that calls for heterogeneity of fisher habitat.

Proposed burning (alternative 2) could affect up to 7,407 acres in the BCRP area. While the actual effects of this activity on fishers are difficult to evaluate, they are not expected to substantially alter fisher use of the area because most of the high-severity burn would be in higher-elevation shrubfields, no considerable impacts are expected in potential denning/resting habitat, and many of the enlarged or newly-created openings would displace small trees of areas of dense lodgepole pine (not preferred fisher habitat).

Other project activities (precommercial thinning, road reconstruction and storage, noxious weed treatments, construction of a fuel break, and various recreational developments) would have minor effects to fishers since they would have small (if any) effects to important habitat components and the species is not particularly sensitive to human disturbance. Road storage would reduce potential trapper access and attendant risk of trapping-related mortality.

While fishers are not old growth obligates, they associate with late-seral forest characteristics (Sauder and Rachlow 2015). Large-diameter snags are also used almost exclusively for maternal densites. Analysis of forest inventory and analysis data reveals an average of 1.4 snags per acre greater than 20 inches d.b.h. across the Idaho Panhandle National Forests, increasing to 1.9 snags per acre of 20 inches or larger on the North Zone (1.3-2.2 snags per acre at 90% confidence intervals; USDA Forest Service 2010). Although this estimate is somewhat smaller (1.6 snags/acre, confidence interval 0.8-2.3) for the Bonners Ferry/Kootenai Geographic Area, the Purcell/Boulder Landscape Area (where the BCRP area is located) contains 2.0 such snags per acre (confidence interval 0.9-3.4). Also, there is currently an estimated 11.8 percent of forested lands allocated as old growth on the Idaho Panhandle National Forests, and 15.9 percent of the Kootenai geographic area (USDA Forest Service 2010). Based on these estimates, old growth and large snag presence is being maintained on the Forests.

Despite a general direction on the Idaho Panhandle National Forests to restore long-lived early seral species, there has also been an effort to preserve old-growth stands, allow natural succession in riparian areas (potentially suitable habitat and important travel corridors), and preserve and recruit large woody debris forest wide. Riparian areas would remain intact through implementation of the Inland Native Fish Strategy and exclusion of activities within riparian habitat conservation areas (see Hydrology Report), and no reductions in allocated old growth would result from this action. While management actions may impact fisher habitat at a localized scale, this would have inconsequential effects relative to natural changes expected to take place over the coming decades. Instead, wildfire, insects/disease, in-growth, and stand succession will largely determine the amount and pattern of fisher habitat on the Forest in the future (USDA Forest Service 2013a).

Bush and Lundberg (2008) estimated that the Idaho Panhandle National Forests contains approximately 520,400 acres (2,106 km^2) of fisher summer habitat and approximately 1,193,760 acres (4,831 km^2) of fisher winter habitat. Samson (2006b), citing Smallwood (1999), asserts that the threshold habitat level to maintain a viable fisher population is about 100,077 acres (405 km^2), or about one-fifth of the available habitat on the Forests. Given this information, the small change to fisher habitat under alternatives 2 and 3 is unlikely to result in a loss of viability of this species. As a result, adequate habitat to maintain viable fisher populations would remain on the Idaho Panhandle National Forests after project implementation. The U.S. Fish and Wildlife Service (2011b) determined that "the best commercial and scientific information available does not indicate that current or future forest management practices and timber harvest threaten the fisher now, or in the foreseeable future."

Consequently, alternatives 2 and 3, in conjunction with the past, present and reasonably foreseeable actions ***may impact*** fisher ***or their habitat, but will not likely contribute to a trend towards Federal listing or cause a loss of viability to the population or species.***

Consistency with the Forest Plan

There are no Revised Forest Plan standards or guidelines specific to fisher. Instead, it is indirectly addressed in the Revised Plan through desired condition FW-DC-VEG-01, FW-DC-VEG-02, FW-DC-VEG-03 and FW-DC-VEG-11 (improve habitat by restoring species structure and composition to more closely reflect HRV); desired condition FW-DC-VEG-07 and guideline FW-GDL-VEG-04 (snag presence); and desired condition FW-DC-WL-12 through 14 (maintenance of old growth, snags and down wood). Additionally, fisher would likely benefit from the Motorized Access Management Direction, which limits motorized access in the Boulder BMU, and subsequently reduces the risk of trapping mortality for this species. All action alternatives are consistent with Forest Plan direction, although alternative 1 does little to restore habitat or encourage development of large-diameter snags.

Flammulated Owl, Pygmy Nuthatch and Fringed Myotis

The proposed treatments would trend capable, but not currently suitable, habitat towards a suitable condition by reducing stand density while favoring retention of larger trees and snags. While some potentially suitable habitat would be made unsuitable by timber harvest, other treated acres are expected to maintain suitability for a much longer time period than if left untreated. Proposed activities may affect individuals of these species, but are not expected to cause a local or regional change in habitat quality or population status.

These three species all require large-diameter (mature and old growth) open-grown dry-site forests dominated by ponderosa pine or Douglas-fir, and the presence of large snags for nesting and roosting. Because of habitat similarities between these species, they are analyzed as a group.

Habitat Relationships

Flammulated Owl

Flammulated owls are seasonal migrants to northern latitudes during the spring and summer. Primary nesting habitat is comprised of the older forests dominated by ponderosa pine and Douglas-fir with 35-65 percent overstory canopy closure (Goggans 1986, Howie and Ritcey 1987, Reynolds and Linkhart 1992). Reynolds and Linkhart (1992) reported that all published North American records of nesting except one came from forests in which ponderosa pine trees were at least present, if not dominant, in the stand. Flammulated owls depend on pileated woodpeckers and flickers to excavate the cavities in which they nest. Their nest trees are at least 14 inches in diameter (McCallum 1994). Although nesting habitat is thought to be more limiting on the landscape, the flammulated owl's preference for the ponderosa pine/Douglas-fir cover type can also be linked to food availability. Reynolds and Linkhart (1992) noted a stronger correlation between prey availability and this cover type than with other common western conifer cover types.

Flammulated owls appear tolerant of some human disturbances, as this species has been known to nest in campgrounds and other areas of human activity with no apparent adverse effects (Hayward and Verner 1994). Because the flammulated owl requires tree cavities for nesting, loss of snags from timber harvest or firewood gathering can impact nesting habitat for this species.

Pygmy Nuthatch

Pygmy nuthatches are sedentary, year round residents of ponderosa pine forests (Ghalambor 2003). They rely heavily on the foliage of live, larger ponderosa pines as foraging habitat and on larger ponderosa pine snags for nesting and roosting cavities (McEllin 1979). Their almost exclusive association with

ponderosa pine, particularly mature stands containing less than 70 percent canopy closure, leads to a patchy distribution of the pygmy nuthatch as they mirror ponderosa pine's distribution (Kingery and Ghalambor 2001, Engle and Harris 2001). Pygmy nuthatch abundance is directly correlated with snag density and foliage volume (Ghalambor 2003). They generally excavate their own nest cavity, but at times are a secondary cavity nester and locate their nest cavities in dead trees or in dead sections of live trees (Ghalambor 2003). Their diet consists mainly of insects during the breeding season, and in some areas they forage almost exclusively on pine seeds in the non-breeding season (Ghalambor 2003).

The main threats to the species are the loss of ponderosa pine dominated forests and low snag densities (Ghalambor 2003). There has been a substantial decline of mature ponderosa pine forests in recent years (Wisdom et al. 2000). This decline is largely due to fire suppression, which has replaced natural regimens of frequent, low intensity fires that maintained relatively open ponderosa stands and has allowed for a marked increase in the density of shade-tolerant tree species (i.e., Douglas-fir), thereby reducing the availability of habitat for the pygmy nuthatch. The encroaching shade tolerant species are also shorter-lived and more susceptible to insects and disease, increasing the amount of ladder fuels and the probability of a stand-replacing fire, which again could lead to the loss of mature ponderosa pine habitat (Wisdom et al. 2000). In addition, studies have shown that reduction of the number of snags greatly diminishes pygmy nuthatch densities by decreasing the availability of suitable nest and roost cavities (Scott 1979).

Fringed Myotis

Fringed myotis are members of the group of bats referred to as the "long-eared" bats. Fringed myotis use a fairly broad range of habitats represented by open areas (e.g., grasslands) interspersed with mature forests (usually ponderosa pine, pinion-juniper or oak) at middle elevations that contain suitable roost sites. Preferred habitats are often near water sources, as this increases available prey and provides access to drinking water in otherwise dry habitats (Keinath 2004). In general, a habitat mosaic is desired, as having roosting and foraging areas in relatively close proximity reduces individual energy demands.

These bats are relatively slow but highly maneuverable flyers, and are most active the first two hours following sunset (O'Farrell and Studier 1980). Fringed myotis feed on insects during flight and glean insects off of vegetation, usually near the top of the forest canopy, with beetles and moths making up the majority of their diet (Keller 2000, O'Farrell and Studier 1980, Wisdom et al. 2000).

Where available, fringed myotis use caves, mines, buildings and rock crevices as day, night, maternity or hibernation roost sites (Ellison et al. 2004). They also roost underneath the bark and inside hollows of snags, particularly larger ponderosa pine and Douglas-fir snags in medium stages of decay (O'Farrell and Studier 1980, Rabe et al. 1998, Weller and Zabel 2001, Rasheed et al. 1995). Generally, snags used as roost sites are in somewhat open microsites within otherwise contiguous forest (Weller and Zabel 2001). Because of the short lifespan of snags, bats using snags to roost require a high density of snags and often move between snags while roosting (Weller and Zabel 2001, Rabe et al. 1998). However, snag use by this species seems to be confined to day roosts (males and non-reproductive females); while old mines, cabins, or rock structures are preferred for maternity roosts (Hayes and Adams 2015, Weller and Zabel 2001).

The main risks to fringed myotis are the loss of suitable habitat for foraging or roosting and human disturbance of roost sites. Keinath (2004) considers survival of breeding females and protection of maternity colonies and hibernacula to be most critical for the species. Fringed myotis, like many bat species, are very sensitive to disturbance or habitat modification and any change in conditions altering the microclimate (e.g., airflow, thermal regime) close to roosts can have a substantial impact (Keinath 2004). Fringed myotis are perhaps more vulnerable to alterations of mature or old growth forest conditions than

most bat species because of their close association with those forests that contain abundant, large snags for roosting (Keinath 2004).

According to Rabe et al. (1998), the use of multiple snags by roosting bats and the short-term nature of snags in the early decompositional stages of decay suggest that bats require higher densities of snags than birds. In addition, indirect mortality is possible from disturbance at maternity colonies before young can fly on their own, or disturbance at hibernacula leading to burning of fat reserves needed for overwinter survival (Rasheed et al. 1995). Finally, riparian areas should be managed to retain natural stream hydrology and healthy riparian vegetation to allow for sufficient water sources and to promote use by emergent insects. Therefore, management activities should: (1) manage for the retention and recruitment of large diameter snags at relatively high densities, particularly in late-successional forests; (2) protect known roost sites to prevent human disturbance or habitat alteration of microsite conditions, and; (3) maintain and improve riparian areas (Wisdom et al. 2000).

Affected Environment

Based on vegetation estimates, ponderosa pine historically comprised as much as 65 percent of dry forest NFS lands on the IPNF. Today, less than 10 percent of this biophysical setting consists of sites that are predominately ponderosa pine (USDA Forest Service 2013a). Primary factors that have contributed to the loss of older ponderosa pine forests include fire suppression and past forest management. Fire suppression has led to the advancing succession of shade-tolerant species such as Douglas-fir and grand fir that crowd out ponderosa pine. In addition, dry, open-grown forests of ponderosa pine and Douglas-fir were common at lower elevations in areas suitable for human settlement. These areas experienced intensive timber harvest, and the resulting access increased harvest of large snags by firewood cutters. In the Kootenai Subbasin, past regeneration timber harvest, as well as historic overstory removal ("high-grading") generally reduced suitable dry-site habitat. These past timber harvest activities, in combination with active fire suppression in unlogged stands, have contributed to the lack of habitat for these species currently throughout portions of their range.

Mature, open-grown, dry-site forests are considered the most critical and limiting habitat feature for flammulated owls. Pygmy nuthatches also prefer mature, open-grown, dry-site forests with ponderosa pine as an essential component. In addition to large snags in mature open-grown dry-site stands, fringed myotis also require old mines as roost sites (maternity and hibernacula). Stands in the drier habitat types (ponderosa pine, Douglas-fir, and dry grand fir) are considered capable habitat for these species. Approximately 5,000 acres (12 percent) of the BCRP area is dry site forest (capable habitat). These stands are generally clustered in the northeastern portion of the project area at a range of elevations on generally south aspects.

Calling surveys for flammulated owls were conducted in the BCRP area in 2009, 2010, 2011 and 2013. No flammulated owls were detected during these surveys. Failure to detect this species is not surprising given that habitat in the Kootenai sub-basin is but a fraction of what it had been historically, and the currently suitable acres in the analysis area are near the limit of what this species will tolerate in terms of density of vegetation. Flammulated owls have historically been detected at only a few locations on the District, including on Dawson Ridge about 8 miles north of the BCRP area.

Pygmy nuthatches have only been documented at a few locations in Boundary County, but no surveys have been conducted specific to this species. Presence has been documented on Dawson Ridge, as well at several low elevation locations (both private and NFS lands) north of the Kootenai River.

While fringed myotis use mature dry forest, they also make extensive use of caves and mines for roost sites – particularly during hibernation. There is no natural cave habitat on this part of the IPNF, but

extensive mining activity (relative to most of the Bonners Ferry District) has occurred within the Boulder Creek drainage. There are several open or partially caved adits near the mouth of McGinty Creek and in the Leonia Knob area (just outside the cumulative effects area), as well as an active mining claim (with a fully caved adit) in upper Boulder Creek. Most of the historic workings in the Idamont ("Boulder City") area was surface mining, although remains of a few buildings still exist. Although it is possible that some of these sites may provide roosting habitat for this species, the nearest documented occurrence of fringed myotis is a maternity colony at the Montgomery Mine, nearly 25 miles northwest of the project area.

Habitat evaluation surveys identified approximately 729 acres of the capable dry forest as potentially suitable nesting/roosting habitat for these species (see "Methodology" subsection, below). In addition, about 763 acres of dry forest that were not evaluated could be potentially suitable based on forest type and size class (greater than 15" dbh). Most of the unsuitable stands are immature or have high proportions of more shade-tolerant species than historically would have been present. Many accessible, low-elevation dry forests on NFS lands have undergone timber harvest in the past. This harvest often involved either clear-cutting or high-grading (taking the largest-diameter trees from a stand) of ponderosa pine – unlike what is being proposed here. Both of these historic logging techniques would have reduced ponderosa pine presence, and ultimately reduced average stem diameter and increased stem density. The majority of potentially suitable stands are on steep, south-facing slopes above Boulder Creek, although several of the potentially suitable stands can be found in more recent dry-site treatment areas authorized by the Katka Peak EIS.

Environmental Consequences

Methodology

As discussed above, mature, open-grown, dry-site forests are considered the most critical and limiting habitat feature for these species. Capable habitat was identified through timber stand exams, based on potential vegetation (habitat type) of the stand. Stands classified as "moderately warm" (or warmer) and "moderately dry" (or drier) potential vegetation were considered capable habitat. Potentially suitable habitat includes those capable stands with a forest (cover) type of ponderosa pine or Douglas-fir, canopy closure between 35 and 65 percent, average d.b.h. greater than 15 inches in the primary canopy layer, and the presence of large (greater than 15 inches) snags.

Habitat evaluation surveys conducted by Forest Service wildlife personnel during 2013 and 2014 examined approximately 1,060 acres of dry forest stands in the analysis area. Using the information from these surveys, along with information contained from timber stand exams, stands were analyzed individually to determine if they contained the habitat parameters necessary to be considered potentially suitable for flammulated owl, pygmy nuthatch or fringed myotis. The potential effects on these species and their habitat were determined by predicting the change in trends toward habitat suitability that would result from each alternative.

In addition to large snags in mature open-grown dry-site stands, the affinity for old mines as roost sites (maternity and hibernacula) by fringed myotis also requires consideration. As discussed above, there are a few open adits associated with historic mining near dry-site forest in the BCRP area.

Alternative 1 – Direct and Indirect Effects

While Alternative 1 would not alter existing vegetation patterns through mechanical means, tree mortality caused by agents such as root disease would continue to exert change on habitat conditions. There would be a continued shift toward denser canopies of shade-tolerant species in capable stands. Douglas-fir trees would continue to be recycled through disease-prone stands, creating a scenario that would discourage the development of more open, older forests of ponderosa pine with a lesser component of Douglas-fir. Old-

growth dry-site forest stands would become increasingly crowded in the understory by shade-tolerant species, causing these stands to move further from suitable habitat conditions. Consequently, the amount of suitable habitat for these species would continue to decrease in the absence of a stand-replacing event.

As discussed above, some of the dry-site habitat in the project area is increasingly becoming more congested in structure due to the presence of shade-tolerant species. Without management intervention, it is likely that these habitats would not trend toward an increase in habitat quality and would face an increasing likelihood of a stand-replacing future event. If a stand-replacing fire were to occur, it would take at least 100 years for successional processes to restore habitat that would begin to provide suitable habitat conditions.

Interrupting the periodic disturbances created by lethal wildfires through continued fire suppression probably has had mixed impacts on members of this habitat group. High-intensity wildfire often reverts stands to an earlier successional stage. In some cases this would interrupt immature stands from reaching habitat suitability, and in other cases would regenerate stands with high densities of small stems of shade-tolerant species that may never reach suitability lacking disturbance. Regardless, fire suppression through the years has heavily contributed to reduction of open grown ponderosa pine stands by preventing periodic underburns in these stands. Since fire suppression is expected to continue at some level, the results would be partially compensated for by activities described under both action alternatives (below).

Since Alternative 1 would not authorize any activities, it would have no direct or indirect effects on these species, although the changes discussed above would continue to influence species presence and distribution.

Direct and Indirect Effects Common to Alternatives 2 and 3

These alternatives propose timber harvest on approximately 503 acres of capable habitat for these species (dry forest), approximately 44 acres of which were determined to be potentially suitable. This includes approximately 31 acres of seedtree harvest, and another 13 acres of group selection harvest. Group selection is expected to maintain, or enhance, suitability by reducing understory congestion, increasing habitat heterogeneity (creation of small openings), and increasing tree diameter in the primary canopy layer by decreasing competition for water and nutrients. Conversely, seedtree harvest would make habitat unsuitable by removing structural complexity (only one size class would remain) and decreasing overstory canopy cover below what these species prefer for nesting/roosting and foraging.

Both the Idaho Partners in Flight (2000) and Montana Partners in Flight (2000) conservation plans recommend dry-site restoration treatments that include removal of small diameter trees and subsequent burning to enhance and/or restore habitat for these species. In addition, van Woudenberg (1999) recommends using “partial cutting and selection silvicultural systems” for long-term regeneration of dry-site landscapes. Most of the currently suitable dry site stands in the BCRP area would trend away from suitable conditions over the next 20 to 50 years if no action were taken, as shade-tolerant Douglas-fir continues to increase canopy cover and compete with large ponderosa pines for nutrients. By contrast, shelterwood and group selection harvest are expected to result in creation or long term (up to100 years) maintenance of existing suitable habitat.

Approximately 123 acres of capable habitat not identified as potentially suitable could be converted to a potentially suitable condition, or trended in this direction, through mechanical treatment. Some of these stands contain large diameter trees in the primary canopy layer, but excessive density in the secondary layers results in dense overstory canopy and understory congestion. Other stands contain smaller diameter (10-15 inches) trees in the primary layer, and are similarly congested by high stem densities in other layers. Both group selection and shelterwood harvest prescriptions are designed to trend currently

unsuitable dry-site stands toward conditions similar to what would have been created through natural disturbances and, therefore, closer to suitable nesting or roosting habitat conditions. These prescriptions are designed to favor ponderosa pine in stands that currently contain a high density of shade-tolerant species in the understory layers. Approximately 58 of these acres would be treated by group selection, and the remaining 65 acres would be a seedtree harvest.

The remaining approximately 336 acres of capable habitat contain a variety of stand conditions, but generally have high densities of small diameter (usually shade-tolerant species) trees making up the bulk of the stand. Large-diameter (greater than 15 inches) and long-lived early seral (ponderosa pine, western white pine and western larch) trees are uncommon or nearly absent in these stands. These stands would be treated by a combination of group selection, shelterwood and seedtree harvest – depending largely on the health of the stand and incidence of long-lived seral species. All three harvest prescriptions would reduce density of shade-tolerant tree species to favor long-lived early seral species, and in doing so would trend these stands toward large-diameter, low density conditions more representative of presettlement conditions that are preferred by these wildlife species.

Both action alternatives propose burning approximately 73 acres of potentially suitable habitat in burn unit 4. This activity is expected to reduce understory density, but not make substantial changes to the stand overstory structure. As a result, it would not affect suitability of this stand.

About 87 acres of precommercial thinning in capable (currently unsuitable) habitat would take place under both action alternatives. These treatments are expected to improve species composition and structure, resulting in stands that are more ecologically stable in the face of potential disturbances. None of the other precommercial thinning proposed under the action alternatives would affect these species because it is in moist-site habitats.

Project activities could result in temporary disturbance to individuals of this habitat group. Disturbance would include the potential removal of some cavities available for nesting, and possible displacement associated with mechanical treatment and prescribed fire. These disturbances are of minor consequence given the mobility of these species, the silvicultural prescription to retain large trees and snags, and the post-treatment benefit of maintaining dry-site forest conditions beneficial to this group.

Treatment would create openings (open conifer stands) larger than 40 acres on dry forest habitat in several units throughout the BCRP area. This would be beneficial for flammulated owls, as Wright (1996) found that suitable microhabitats may not be occupied by flammulated owls unless these conditions occurred across larger suitable landscapes. Nonetheless, treatment of smaller areas may provide habitat for other members of this habitat group (pygmy nuthatch and fringed myotis) even if it remains unused by flammulated owls.

Road treatments are not expected to substantially impact these species in the short term (up to 20 years), as the road segments to be reconstructed or improved are currently drivable and available to woodcutters for at least a portion of the year. In the long term, storage of FSR 2113A and the end of FSR 2662 may reduce woodcutter access (and preserve roadside snags) along these routes over the time period they remain in storage.

Invasive plant (weed) treatments would occur along roads, trailheads, and other disturbed areas. This activity could result in slight reductions to prey (insect) populations in treated areas, but the overall effect would be localized and inconsequential.

All of the other proposed activities (construction of a fuel break near Black Mountain, creation of a trailhead at the west end of the River Walk trail, and converting FSR 1304G to a non-motorized trail) are

expected to have little or no effect on these species. None of these would affect dry-site forest, so would not result in appreciable habitat modifications or disturbance.

Alternative 2 - Direct and Indirect Effects

Proposed burn only units contain an additional approximately 850 acres of dry-site (capable) habitat, including about 97 other acres of potentially suitable nesting habitat in burn unit 3 and a small portion of burn unit 2. These burns are intended to mimic mixed-severity fires such as would have occurred naturally, and therefore are expected to benefit these species by maintaining currently suitable habitat and thinning dense forest by underburning and occasional crown fire in immature stands. Similarly, burning in unsuitable stands would reduce understory congestion and create small openings in the canopy that would increase structural complexity and encourage seral species establishment.

Cumulative Effects Common to Alternatives 2 and 3

The following past, ongoing and reasonably foreseeable actions were considered in a cumulative effects discussion for flammulated owl, pygmy nuthatch and fringed myotis:

Public Activities – Firewood cutting will likely continue along open and seasonally open roads in the analysis area, potentially reducing large snags within 200 feet of the roadside. Snag removal can occur along any of the open and seasonally restricted roads in the analysis area. However, since firewood removal affects a relatively small portion of capable habitat and usually only results in removal of "hard" snags that are less likely to be used by secondary cavity nesters, this activity would have minor effects on suitable habitat. Other recreational activities are unlikely to have any impacts on flammulated owl, pygmy nuthatch or fringed myotis since they would not result in habitat modifications and these species are not readily disturbed by sporadic human activity. Thus, overall incremental cumulative effects of these activities are minimal.

North Zone Roadside Salvage – This activity would occur within 200 feet of several roads in the BCRP area that are also currently open to firewood cutters. However, roadside salvage by design would not affect allocated old growth, and would generally only remove pockets of down trees that do not provide important habitat attributes for these species. Cumulative effects from this activity overlap those discussed in for firewood gathering, are minimal, and thus would not result in consequential additional effects to flammulated owls, pygmy nuthatch or fringed myotis.

Conclusion

The proposed treatments would trend capable, but not currently suitable, habitat towards a suitable habitat condition by reducing stand density while favoring retention of larger trees and snags. Approximately 44 acres of potentially suitable habitat would be impacted by timber harvest, 13 of which would remain so after harvest. The action alternatives also propose activity in approximately 123 acres of stands that could be trended toward suitability through mechanical treatment, about 58 acres of which are expected to become suitable within about 20 years post-harvest, and maintain suitability for a much longer time period than if left untreated. While there may be some risk to capable habitat (snag loss and reduction of roosting habitat) associated with timber harvest, several studies have documented flammulated owl use of selectively logged sites (Howie and Ritcey 1987, van Woudenberg 1999, Wright 1996, Wright et al. 1997). Additionally, there would seem to be little risk in treating stands that are currently unsuitable due to excessive overstory and understory density.

Samson (2006a) estimated that the critical habitat threshold for a minimum viable population of flammulated owls is 4,700 acres, while the IPNF alone is estimated to contain approximately 32,967 acres of habitat (Bush and Lundberg 2008). Under the 2015 revised Forest Plan, habitat for this species is expected to increase over the next 5 decades from increases in large snag densities and increases in actual

and potential habitat over this time as a result of a warmer, drier climate and increase in low- and moderate-severity wildfires (USDA Forest Service 2013a).

By inference, it is reasonable to assume that adequate habitat exists to support viable populations of species with similar habitat requirements (pygmy nuthatch and fringed myotis) as well. Based on this analysis, the action alternatives ***may impact individual*** flammulated owls, pygmy nuthatches and fringed myotis ***or their habitat, but will not likely contribute to a trend towards Federal listing or cause a loss of viability to the population or species.***

Consistency with Forest Plan

There are no Revised Forest Plan standards or guidelines specific to these species. Dry forest species are indirectly addressed in the Revised Plan through objective FW-OBJ-WL-01, desired condition FW-DC-VEG-01, FW-DC-VEG-02, FW-DC-VEG-03 and FW-DC-VEG-11 (improve habitat by restoring species structure and composition to more closely reflect HRV); and desired condition FW-DC-VEG-07 and guideline FW-GDL-VEG-04 (snag presence). The action alternatives are consistent with this direction, while alternative 1 does little to restore habitat or encourage large-diameter snag development.

Other Aspects of the BCRP Proposal

American Beaver Reintroduction

The BCRP also proposes reintroduction of American beaver (*Castor canadensis*) in the Boulder Meadows portion of the upper Boulder Creek watershed as an opportunity in addition to the proposed action (the Deciding Official can choose to implement as funding becomes available). Beavers were historically widespread across most of North America, but were extirpated from much of their former range (mainly through trapping) by the early twentieth century. However, research has demonstrated that beaver presence has positive ecological effects that include maintaining and diversifying stream and riparian habitat, and assisting in restoration of degraded stream systems. Beaver activity also can result in more diversity and richness in populations of plants, birds, fish, amphibians, reptiles, and mammals (Pollock et al. 2015). The Idaho State Wildlife Action Plan recommends reestablishing beaver populations as an "effective tool to restoring habitat and ecological function to riverine systems" in the Okanagon Highlands geographic area where the BCRP is located (Idaho Department of Fish and Game 2017).

Anecdotal information suggests that beaver were once present in the upper Boulder Creek watershed, but have been largely absent for a number of years. Field visits during planning for the BCRP revealed signs of beaver presence (chewed trees), but no evidence of occupation by multiple individuals (colonies). It is possible that beavers were locally extirpated by fur trapping, and have difficulty recolonizing the upper portion of the drainage due to lack of presence in adjacent watersheds and physical barriers (waterfalls and steep canyons) downstream.

Initially, upper Boulder Creek (specifically, the Boulder Meadows area) would seem to be a good candidate for beaver restoration. The stream here is of relatively low gradient, with a wide floodplain and somewhat incised channel (which would presumably become less so in the presence of beaver activity) and occasional deep pools to provide cover for introduced animals prior to dam-induced flooding. There is evidence of past occupancy, and the area is surrounded by National Forest System Lands with no current management requirements that would conflict with beaver presence. The only infrastructure at risk is a single road through the floodplain leading to the Boulder Meadows camp/trailhead and a trail ("Kelly Pass" Tr 155) that could be negatively impacted. Additionally, a wolf pack ("Calder Mountain"

pack) has used the area as part of its home range for a number of years. While wolves can prey on beavers, they generally improve beaver habitat by preventing large numbers of ungulates (particularly elk) from congregating in riparian areas for extensive periods and consuming willow and cottonwood saplings used by beavers for food and construction material (Pollock et al. 2015).

Factors that could inhibit establishment of beaver populations include the flashy hydrology of Boulder Creek itself (spring runoff and rain-on-snow events) which could destroy dams in the main channel. Additionally, the drainage contains a limited amount of habitat (most of the lower drainage is a steep, incised canyon that does not lend itself to beaver occupancy) and the somewhat remote location makes colonization and dispersal to adjacent drainages difficult. An adjacent drainage to the west (Twentymile Creek) contains a community water system where beaver presence may not be tolerated. Finally, there are a number of predators – including grizzly and black bears, mountain lions, gray wolves, and coyotes – that could make it challenging for reintroduced beavers to become established.

The IPNF readily acknowledges that beaver relocation can be challenging, and mortality rates for relocated beavers often are high. If initial relocation efforts are unsuccessful (or if the habitat proves to be unsuitable), artificial structures (called "beaver dam analogues") or vegetation (shrub) plantings would be considered.

Use of Aminopyralid

The proposed uses of aminopyralid do not appear to pose acute or chronic risk to terrestrial and aquatic animals. Aminopyralid is practically nontoxic in acute toxicity tests in terrestrial and aquatic animals. The toxicity category is practically nontoxic for leopard frogs. Aminopyralid acid is characterized as practically nontoxic to avian species on an acute oral exposure basis and a subacute dietary exposure basis. Testing of honeybees indicated no acute or sublethal effects, so aminopyralid is classified as practically nontoxic to insects on an acute exposure basis. Although risk to terrestrial invertebrates is not typically evaluated, the low toxicity of aminopyralid to beneficial insects suggests that the likelihood of adverse effects is also low. Aminopyralid is characterized as practically non-toxic to pollinators on an acute oral exposure basis.

Consistent with aminopyralid being practically non-toxic to mammals on an acute oral exposure basis (LD_{50}>5,000 mg/kg bw) no acute risk levels of concern (RQ>0.5) are exceeded for any sized mammal. Using dose based RQ values, no chronic risk levels of concern (RQ>1.0) are exceeded for small (15 g), medium (30 g) or large (1000 g) mammals foraging on short grass, tall grass, broadleaf plants/small insects or seeds based on a NOEC of 1,000 mg a.e./kg of diet (USDI Environmental Protection Agency 2005). Based on the screening level risk assessment, proposed use of aminopyralid does not appear to present a risk to aquatic or terrestrial animals. As a result, use of this hebicide in the BCRP area would have inconsequential effects to the wildlife resource.

Design Features

Grizzly Bear – Timber hauling and major road work (reconstruction and large culvert replacement) on restricted roads would be conducted in three phases grouped by road segments: phase 1) FSR 1304 and associated spurs, phase 2) FSR 628 & associated spurs plus FSR 2110 and temp roads associated with this road, and phase 3) FSR 2662 (2113 and 2113A). No two of these phases may be active during the same bear year (4/1 – 11/30). The proposed temporary road emanating from FSR 2113 would be constructed and used in winter only (i.e. "snow road"). Timber harvest of unit 50 would not take place during the same year that phase 3 is active. Helicopter harvest using landings accessed by FSR 2113A would not be active during phases 1 or 2.

Estimated Effectiveness - High. The U.S. Fish and Wildlife Service maintains that some level of incidental take of female grizzly bears would occur within individual BMUs in the Cabinet-Yaak Recovery Zone as long as open motorized route density (OMRD) exceeds one mile per square mile in more than 33 percent of a BMU (USDI Fish and Wildlife Service 2011). This feature would maintain OMRD at 33 percent or less during project implementation. This provision would be built into timber harvest contracts and implemented by the sale administrator.

Grizzly Bear – Storage of FSR 1304G would take place prior to or concurrent with reconstruction and use of currently undrivable road segments and temp roads emanating from FSR 1304 (1304A, 1304C, 1304D and 1304H) and FSR 2110. Storage of FSR 2111 (Leonia Project) and 0.8 mile of FSR 2662 would take place prior to or concurrent with reconstruction and use of currently undrivable road segments and temp roads emanating from FSR 2110.

Estimated Effectiveness - Moderate. This feature assures there would be no net decrease of core habitat in the Boulder BMU during project implementation. This provision would be built into timber harvest contracts and implemented by the sale administrator.

Grizzly Bear – No motorized off-road project activities (with the exception of burning – see below), road decommissioning and storage, road construction and reconstruction, or hauling on restricted roads would take place between April 1 and June 15.

Estimated Effectiveness - High. Spring is the most sensitive time period for grizzly bears when their fat reserves have been severely depleted and foraging to rebuild energy reserves is their primary focus (U.S. Fish and Wildlife Service 2011b). Limiting project activities during this season greatly reduces the potential for effects to grizzly bear from disturbance or displacement from foraging habitat. This provision would be built into timber harvest contracts and implemented by the sale administrator.

Grizzly Bear – Burning would be accomplished in fall (rather than spring) to the maximum extent practicable.

Estimated Effectiveness – Moderate. Since spring is the most sensitive time period for grizzly bears, limiting operations during this season would greatly reduce potential effects. It is the intent of the District to burn the proposed units in as few entries as practicable. Nevertheless, unforeseen circumstances (weather, etc.) may hinder this process to the extent that helicopter use over a number of days and years would be required. The preferred method is to burn the units during the fall months if acceptable burning windows are available. However, given the limitations on fall burning in North Idaho (typically driven by air quality constraints), it may be necessary to burn whole units or portions of units during the spring (when air quality poses less of an issue).

Grizzly Bear – Where regeneration harvest creates contiguous openings greater than approximately 20 acres adjacent to yearlong open roads, maintain visual screening cover so that sight distances are generally limited to 200 meters or less. Screening cover should mainly be comprised of leave clumps strategically placed in harvest units, but can also include topographic features (steep slopes, draws, small prominences, or roadside cutslopes), advanced regeneration or shrub cover, and roadside leave strips. This may include, but is not limited to, units 55, 228, 230, 235, and 236; and portions of units 38, 40, 43, 46, 51, and 143.

This feature would not apply where road segments are in close proximity to one another in an opening (e.g., units 50, 52, 116, 176, 224, and 240) or where roads and trails are in close proximity to one another in an opening (e.g., units 141, 142, and 238). Also, units 64 and 65 are group selection prescription, so would inherently retain clumps. Units 30, 34, 76, 212, 222, and 241 are generally hidden by topographic features (steep slopes make it difficult to see into these units).

Estimated Effectiveness - Moderate. Large openings adjacent to roads accessible to the public can pose a mortality risk for grizzly bears from poaching, or mistaken identity by legal hunters during black bear seasons. Limiting sight distances in created openings along open roads considerably reduces this risk by making bears less visible to passing motorized traffic. This provision is less important for openings that are relatively narrow (less than 200 meters across), since no portion would be more than about 600 feet from hiding cover. Similarly, grizzly bears are not expected to make substantial use of areas where multiple roads, or roads and trails, are in close proximity to one another due to the nearby presence of several permanent sources of potential disturbance. The risk of mortality along open roads would be considerably reduced after about 5-10 years post-treatment, when shrub cover and regenerating conifers would once again provide hiding cover.

This feature has a high probability of being implemented, since it would be incorporated into harvest unit layout and monitored by the sale administrator.

Grizzly Bear – Retain live vegetation or provide other barriers (rocks, slash, etc.) in unit 128 to prevent illegal ATV access to trail 182 (Katka Peak) through this harvest unit.

Estimated Effectiveness - High. This provision would be built into timber harvest contracts and implemented by the sale administrator.

Grizzly Bear – Currently restricted and temporary roads used for project activities would be effectively gated and closed to public use during the active bear year (April 1 – November 30).

Estimated Effectiveness - High. Limiting the motorized use of forest roads has been shown to increase the effectiveness of habitat for wildlife and decrease the risk of mortality for species such as grizzly bears (USDI Fish and Wildlife Service 1993, 2011; Interagency Grizzly Bear Committee 1994). This provision would be built into timber harvest contracts and implemented by the sale administrator.

Grizzly Bear Management and Protection Plan/Food Storage Order – Forest Service personnel, contractors and subcontractors would be given a copy of the Grizzly Bear Management and Protection Plan and the IPNF Food Storage Order. The NFS lands within the proposed action areas are covered by the IPNF Food Storage Order. The order would be included in all contracts. Compliance with the provisions of the IPNF Food Storage Order is mandatory.

Estimated Effectiveness – High. Improperly stored food and garbage is identified as a principle cause of grizzly bear mortality and following established food and garbage storage guidelines has been shown to substantially reduce or eliminate conflicts between humans and wildlife, particularly bears (Wakkinen and Kasworm 2004, U.S. Fish and Wildlife Service 1993, Harms 1977).

Other Threatened, Endangered, and Sensitive (TES) Wildlife Species Management – If any TES species is located during project layout or implementation, timber harvest and associated activities would be altered, as necessary, so that proper protection measures are taken. Timber sale contract provision B(T)6.25, Protection of Threatened, Endangered And Sensitive Species, would be included in any timber sale contract.

Estimated Effectiveness – High. Contract provisions for protection of TES habitats and locations are utilized in all contracts and have been effective in protecting these resources (see Forest Plan Monitoring and Evaluation reports).

Gray Wolf – Any gray wolf den or rendezvous sites identified in or adjacent to proposed activity areas would be spatially and/or temporally buffered as appropriate. No project activities (excluding maintenance and hauling on year-round open road systems) would be allowed within one (1) mile of occupied sites, from April 1-July 1 for den sites and from July 1-August 15 for rendezvous sites. Upon

review by the District Wildlife Biologist, these distances could decrease based on topographical characteristics at each site.

Estimated Effectiveness – High. The U.S. Fish and Wildlife Service has determined that "there is little, if any, need for land-use restrictions to protect wolves in most situations, with the possible exception of temporary restrictions around active den sites on federally managed lands," and that restricting activity around sensitive sites during the denning period effectively limits potential disturbance to wolf pups.

Fuels Treatment – In areas where grapple piling is prescribed for fuel reduction, approximately one slash pile per five acres would be left unburned where consistent with fuels reduction objectives to provide habitat for small forest animals (e.g., snowshoe hares).

Estimated Effectiveness – High. Research has shown an increase in species diversity and richness when some slash piles are left unburned during regeneration harvest operations (Sullivan et al. 2012). Timber sale and brush disposal contracts allow for effective control of operations and have the flexibility to meet these criteria.

Wildlife Tree Retention – All merchantable snags greater than 14 inches in diameter would be retained to the maximum extent possible. Smaller snags would be retained if they do not contribute to excessive understory congestion, and retention is consistent with unit management objectives. Large snags that are felled for safety reasons should remain on site to provide for wildlife habitat and long-term site productivity.

Estimated Effectiveness – Moderate. This measure would be implemented using project layout, contract provisions, compliance monitoring and fuels treatment, and would have a moderate chance of avoiding and/or reducing adverse effects on snag dependent wildlife. It would not be the intent of this project to willfully remove the high hazard snags, and snags in the advanced stages of decay ("soft" snags). Some of these "soft" snags would survive and remain standing during the life of the project. Due to Occupational Health and Safety Administration (OSHA) guidelines, most contractors would remove snags deemed to pose a safety risk to ground crews. Consequently, group selection portions of the prescription would generally result in higher levels of snag retention since portions of units would be left untreated and contractor exposure to hazardous snags subsequently reduced. In addition, the "hard" snags preferred by the District for their ability to remain longer on the landscape are less likely to be felled as hazards than softer snags.

Personal experience has demonstrated that tree harvesting and subsequent burning removes a portion of existing snags, especially the "soft snags." However, through the strategic placement of leave patches or clumps, snags within these areas would be protected. In addition, prescribed underburning would recruit some "new" snags where residual green trees are inadvertently fire-killed.

Goshawk Nest Site Protection –A no activity area of 40-acres would be placed around any known or newly discovered goshawk nest, or any other nest that has been active in the past five years (Brewer et al. 2009). If the nest tree is not roughly centered within the 40-acre no activity area, an additional no activity distance of up to 745 feet (the radius of a 40-acre circle) may be implemented between the nest tree and harvest units to reduce impacts to habitat around the nest site from project activities. The District Wildlife Biologist would determine if this additional no activity distance would be implemented based on factors such as topography, the location of the nest tree within the 40-acre nest area and the distance of the nest tree from existing disturbances (e.g. roads).

No motorized off-road project activities, road decommissioning and storage, road construction and reconstruction, or hauling on restricted roads would be allowed within up to ½ mile of active nest areas from April 15 to August 15 to promote nesting success and provide forage opportunities for adults and

fledgling goshawks during the fledgling dependency period. Activity restrictions may be removed after June 30 if the District Wildlife Biologist determines the nest site is inactive or unsuccessful (Maj 1996).

Estimated Effectiveness – Moderate to High. Protection measures would allow continued nesting and successful rearing during and after project implementation (Reynolds et al. 1992). The 40-acre no-activity area has been shown to provide an adequate post-harvest nest stand for goshawks. Seasonal restrictions are likely to minimize disturbance to active nests, particularly if ground-based systems are not being used within ½ mile.

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